THEMIS

Installation Manual

RES-12XR3

Configuration 7

1RU 19” Rack-Mount Rugged Enterprise Server
with X8DTU-F Motherboard Configuration/
Two Quad/Dual-Core 5500 or Quad/Six-Core 5600 Xeon CPUs

RES-12XR3 - Configuration 7

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*RES-12XR3 Installation Manual - Configuration 7**

Version 1.2—July 2011

* SuperMicro Motherboard X8DTU-F

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TRADEMARKS and SERVICEMARKS

CE Marking

This product complies with the European EMC Directive (2004/108/EC) and the European Low Voltage Safety Directive (2006/95/EC)/.

Safety Precautions

Instructions regarding safety precautions during installation, operation, or maintenance of the equipment are given in the section entitled “Safety Instructions” on page iv.

WARNINGS and CAUTIONS

The definitions of WARNINGS and CAUTIONS as used in this document are given in the Preface in the section entitled “Notes, Cautions, Warnings, and Sidebars”.

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RES-12XR3 Installation Manual - Configuration 7, Version 1.2

July 2011

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Version Revision History

Version 1.2 ..... July 2011

- Added Appendix E, “Optional RES Audio/USB/Serial Port Module”
- Updated Appendix F, “Repackaging Instructions” to reflect new packaging.
- Updated Appendix B, “Rack-Mount Slide Installation” to reflect current screw sizes, and added part numbers for the hardware kits.

Version 1.1 .....March 2011

- Added RES Matrix tables 2&3 to the Preface.
- Updated maximum memory capacity throughout the manual related to the current revision of the X8DTU-F motherboard.
- Updated information in *Table 1-2*, page 1-2 & *Table 1-7*, page 1-15.
- added remarks regarding power supply module LED behavior in Section 2.3.4, “Turning the System Off,” on page 2-21.
- Updated *Table 2-5,* "1RU Riser Cards A vailable for the X8DTU-F Mother - board," on page 2-8.
- Changed photos in *Figure 2-5—Figure 2-7* to display different riser card option.
- Completely reworked Chapter 3, "BIOS Setup Utility" to the latest version used on the X8DTU-F motherboard.
- Added Appendix D, “Optional Remote On/Off Switch”
- Added Appendix F, “Repackaging Instructions” (Formerly Appendix E).
- Added clarifying remarks stating that the left PCI slot is not used.
- Updated *Figure 1-3,* "X8DTU-F Motherboard Block Diagram," on page 1-3.
- Added *Table 1-3,* "Power Supply LED Behavior," on page 1-10
- Assorted minor edits and changes throughout the manual.

Version 1.0..... February 2010

Safety Instructions

To maximize user safety and ensure correct device operation, all instructions contained in this section should be read carefully.

Caution: It is important that the user observe all warnings and instructions that are on the device and contained in this manual.

- The device must be used in accordance with the instructions for use.
- Electrical installations in the room must correspond to the requirements of respective regulations.
- Take care that there are no cables, particularly mains cables, in areas where persons can trip over them.
- Do not use a mains connection in sockets shared by a number of other power consumers. Do not use an extension cable.
- Only use the mains cable supplied.
- The unit is completely disconnected from the power source only when the power cord is disconnected from the power source. Therefore the power cord and its connectors must always remain easily accessible.
- Do not set up the device in the proximity of heat sources or in a damp location. Make sure the device has adequate ventilation.
- All connection cables must be screwed or locked to the chassis housing.
- The device is designed to be used in horizontal position only.
- The device is no longer safe to operate when
  - — the device has visible damage or
  - — the device no longer functions.
- In these cases, the device must be shut down and secured against unintentional operation.
- Repairs may only be carried out by a person authorized by Themis Computer.
- The device may only be opened for the installation and removal of extension (PCI) cards, memory modules, storage drives, fan housings, power supplies,

and the lithium battery—all in accordance with the instructions given in this manual.

- If extensions are made to the device, the legal stipulations and the device specifications must be observed.
- The device must be switched off when removing the top cover; for example, before installing extension (PCI) cards.

Operation of Laser Source Devices

DVD/CD-ROM drives contain laser light-emitting diodes (classified in accordance with IEC 825-1:1993: LASER CLASS 1) and, therefore, must not be opened.

If the enclosure of such a drive is opened, invisible laser radiation is emitted. Do not allow yourself to be exposed to this radiation.

The laser system meets the code of Federal Regulations 21 CFR,1040 for the USA and Canadian Radiation Emitting Devices Act, REDR C 1370.

Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. Always take the following precautions:

1. Transport boards in static-safe containers such as boxes or bags.
2. Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
3. Always be properly grounded when touching a sensitive board, component, or assembly.
4. Store electrostatic-sensitive boards in protective packaging or on conductive foam.

Grounding Methods

Guard against electrostatic damage at workstations by following these steps:

1. Cover workstations with approved anti-static material. Provide a wrist strap connected to a work surface and properly grounded tools and equipment.

2. Use anti-static mats, heel straps, or air ionizers to give added protection.
3. Handle electrostatic-sensitive components, boards, and assemblies by the case or the PCB edge.
4. Avoid contact with pins, leads, or circuitry.
5. Turn off power and input signals before inserting and removing connectors or test equipment.
6. Keep the work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
7. Use field service tools, such as cutters, screwdrivers, and vacuums that are conductive.
8. Always place drives and boards PCB-assembly-side down on the foam.

Instructions for the Lithium Battery

Systems are equipped with a lithium battery installed on the motherboard. To replace this battery, please observe the instructions that are described in this manual.

Warning: There is a danger of explosion when the wrong type of battery is used as a replacement.

Table of Contents

List of Figures

List of Tables

Preface

This document, entitled *RES-12XR3 Installation Manual—Configuration 7*, provides instructions on how to install, configure, power up, and boot the Themis Rugged Enterprise Server RES-12XR3 Configuration 7 (see *Figure 1* below), which is based on two 64-bit Intel® 5500-Series Xeon™ Quad/Dual-Core CPUs or two Intel® 5600-Series Xeon™ Quad/Six-Core CPUs.

RES-12XR3 Configuration 7 supports one motherboard in a 20”-deep chassis:

- SuperMicro **X8DTU-F**

(A matrix describing 20”-deep chassis configurations is given in *Table 1*, page xviii. A matrix describing 17”-deep chassis configurations is given in *Table 2* on page xix).

Figure 1. Rugged Enterprise Server Model RES-12XR3

Table 1. RES-*x*2XR3 20”-Deep Chassis Manual Matrix

Category	Motherboard[a]	CPU Sockets	RES-32XR3 Manual Part Number	RES-22XR3 Manual Part Number	RES-22XR3 with Riser Manual Part Number	RES-12XR3 Manual Part Number
Configuration 1	X8DTH-iF X8DTH-6F	**2**	**116790-024**	**116789-024**		
Configuration 2	X8DTi X8DTi-F X8DTi-LN4F	**2**	**117022-024**	**117017-024**		
Configuration 3	X8DT3 X8DT3-F X8DT3-LN4F	**2**	**117023-024**	**117018-024**		
Configuration 4	X8DTN+	**2**	**117024-024**	**117019-024**		
Configuration 5	X8DAi X8DA3	**2**	**117025-024**	**117020-024**		
Configuration 6*	X8DAH+-F	**2**	**117026-024**	**117021-024**		
Configuration 7	X8DTU-F				**117280-024**	**116970-024**

Naming Key: X8D*vwxyz*

- System RES-*x*2XR3, where *x* = 3, 2, or 1

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip
* Configuration 6 motherboard X8DAH+-F supports both audio and video; however, the naming key does not contain a “T” in the title.

w: H = Two Tylersberg Northbridge chips
blank = One Tylersberg Northbridge chip
U = Motherboard with cutout

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

a—All motherboards measure 12”W x 13”L except X8DTN+ and X8DAH+-F, which are 13.68”W x 13” L.

Table 2. RES-*x*2XR3S / RES-*x*1XR3 17”-Deep[a] Chassis Manual Matrix

Mother-board	CPU Sockets	RES-32XR3S Manual P/N	RES-22XR3S Manual P/N	RES-12XR3S Manual P/N	RES-31XR3 Manual P/N	RES-21XR3 Manual P/N	RES-11XR3 Manual P/N
X8DTL-6F X8DTL-6	**2**	**117408-024**	**117412-024**	**117416-024**			
X8DTL-3F X8DTL-3	**2**	**117409-024**	**117413-024**	**117417-024**			
X8DTL-iF X8DTL-i	**2**	**117410-024**	**117414-024**	**117418-024**			
X8DAL-3 X8DAL-i	**2**	**117411-024**	**117415-024**	**117419-024**			
X8SAX	**1**				**117420-024**	**117421-024**	
X8ST3-F X8STE	**1**				**117385-024**	**117422-024**	
X8STi X8STi-F X8STi-LN4 X8STi-3F	**1**					**118188-024**	**117423-024**

Naming Key: X8*uvwxyz*

- System RES-*x*2XR3S and RES-*x*1XR3, where *x* = 3, 2, or 1

u: D = Double CPU sockets
S = Single CPU socket

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip

w: Not applicable

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

a—The 17”-deep RES XR3 chassis actually measures 17.07” deep, but for simplicity will continue to be referred to as being 17” deep throughout these manuals.

A matrix describing RES chassis configur ed for front-I/O c onnector and front-PCI card access in a 16”-deep chassis is given in *Table 3*. This chassis design makes it more convenient to install cables to the system and demands no access to the rear of the chassis except to replace a fan. *Figure 2* shows the front view of a standard rear-I/O RES-32 chassis (*Figure 3* on page xxi shows the rear view); *Figure 4* shows the front view of a front-I/O RES-32 chassis (*Figure 5* shows the rear view).

Table 3. Front I/O 16”-Deep Chassis Manual Matrix

Mother-board	CPU Sockets	RES-32XR3/FIO Manual P/N	RES-22XR3/FIO Manual P/N
X8DAH+-F*****	**2**	**117611-024**	
X8DTU-F	**2**		**117664-024**

Naming Key: X8*uvwxyz* ● System RES-*x*2XR3S and RES-*x*1XR3, where *x* = 3, 2, or 1

*RES-32XR3/FIO motherboard X8DAH+-F supports both audio and video; however, the naming key does not contain a “T” in the title.

u: D = Double CPU sockets
S = Single CPU socket

v: A = Sound chip; no graphics chip
T = Graphics chip; no sound chip

w: Not applicable

x: i = SATA only
3 = SAS 1.0
6 = SAS 2.0

y: LN4 = Extra gigabit Ethernet controller for two extra ports

z: F = IPMI
blank = No IPMI

Figure 2. Front View of a Standard Rear-I/O RES-32 Chassis (Doors Removed)

Figure 3. Rear View of a Standard Rear-I/O RES-32 Chassis

Figure 4. Front View of a Front-I/O RES-32 Chassis

Figure 5. Rear View of a Front-I/O RES-32 Chassis

The 1RU-high (1.75”) RES-12XR3 has been designed to fit into a standard 19” rack and is provided with rack-mount brackets with handles. *Optional* rack-mount slides are also available. The RES-12XR3 is rugged enough to withstand extreme shock (up to 35G), temperature, and EMI as that associated with such demanding markets as the military, aerospace, and telecommunications industries.

Intel processors supported by RES-12XR3 include either

- Two Intel 5500-Series Xeon Quad-Core CPUs, or
- Two Intel 5600-Series Xeon Quad/Six-Core CPUs

which operate at a QPI (QuickPath Interc onnect) up to 6.4 GT/s and support a total memory capacity of 192 GigaBytes (12 16-GB DIMMs) using 1066-MHz DDR3 ECC Registered memory modules. Changing memory speeds—1333 MHz and 800 MHz—is supported by lower capacity DIMMs, hence lower total memory capacity.

RES-12XR3 is based on the functionality and capability of the following Intel chip-set:

- Intel 5520 (Tylersburg) chipset
- ICH1OR + IOH-36D

An overview of RES-12XR3 design and specifications is given in Chapter 1, "Overview and Specifications", of this manual.

This manual is intended for an experien ced system administrator with a knowledge of both networking and high-speed server systems.

Website Information

Themis Computer corporate and product information may be accessed on the World Wide Web by browsing the website http://www.themis.com.

Your Comments are Welcome

We are interested in improving our documentation and welcome your comments and suggestions. You can email your comments to us at **docfeedback@themis.com**. Please include the document part number in the subject line of your email.

Notes, Cautions, Warnings, and Sidebars

The following icons and formatted text are included in this document for the reasons described:

Note: A note provides additional information concerning the procedure or action being described.

Caution: A caution describes a procedure or act ion that may result in damage to the equipment. This may involve—but is not restricted to—heavy equipment or sharp objects. To reduce the risk, follow the instructions accompanying this symbol.

Warning: A warning describes a procedure or action that may cause injury or death to the operator as a result of hazardous vol tages. To reduce the risk, follow the instructions accompanying this symbol.

Sidebar: A “sidebar” adds detail to th e section within which it is placed, but is not absolutely vital to the description or procedure of the section.

General Section

Chapter 1

Overview and Specifications

1.1 Overview

The **RES-12XR3 Configuration 7** (see *Figure 1-1* below; a block diagram is given in *Figure 1-3*, page 1-3) is a rack-mounted hi gh-performance system designed specifically for above-average shock and vibration environments. The RES-12XR3 supports two Intel® 1366-pin LGA 64-bit 5500/5600-Series Xeon™ processors, each with a QPI (Quick-Path In terconnect) up to 6.4 GT/s (Giga-Transfers per Second) supporting 192 GB of 1333/ 1066/800-MHz DDR3 ECC Re gistered memory modules. Its computer/graphics-intensive and diverse-I/O capa bilities are ideal for military/aerospace and commer cial telecommunications applications. Motherboard options supported by Configuration 7 are listed in *Table 1-1* on page 1-2.

Figure 1-1. RES-12XR3 (with Front Doors installed)

Table 1-1. RES-12XR3 Motherboard Options—Configuration 7

Mother-board[a]	IPMI	SATA	SAS	Memory Slots	Graphics	Audio	PCI-e, PCI-X, and PCI or UIO Slots				
							PCI-e x16	PCI-e x8	PCI-e x4	PCI-X	UIO
X8DTU-F	Yes	Yes	—	12	Yes	—	1	2	—	—	—

a—SuperMicro Computer, Inc.

The RES-12XR3 is designed within a 1R U-high (1.75") form-factor 20" (50.8 cm) deep and 17" (43.2 cm) wide (which, with mounting brackets, fits a 19"-wide rack; see *Figure 1-2*). Major features of the RES-12XR3 are described in *Table 1-2*, page 1-4.

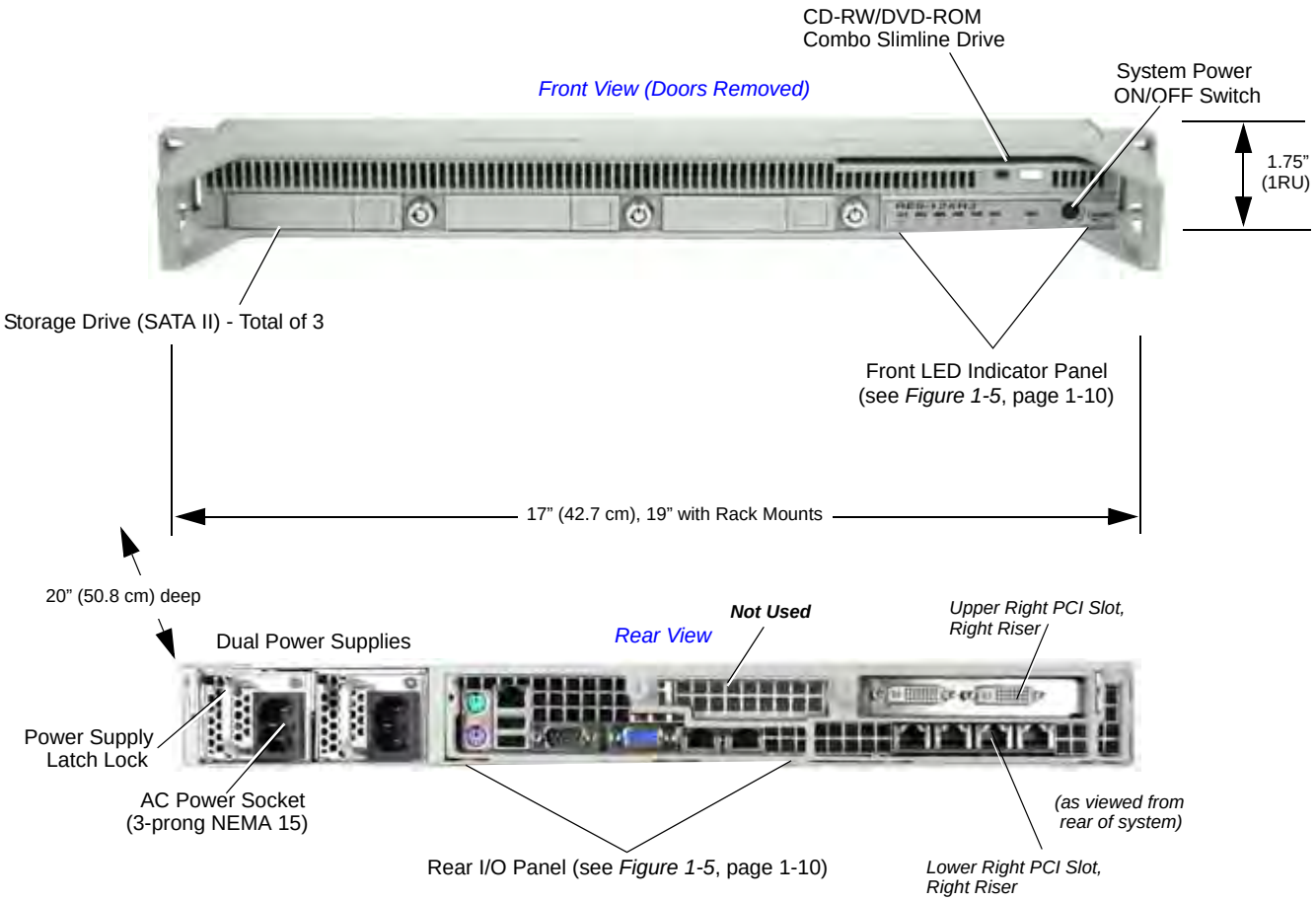


Figure 1-2. External Features of the RES-12XR3 (X8DTU-F Motherboard)

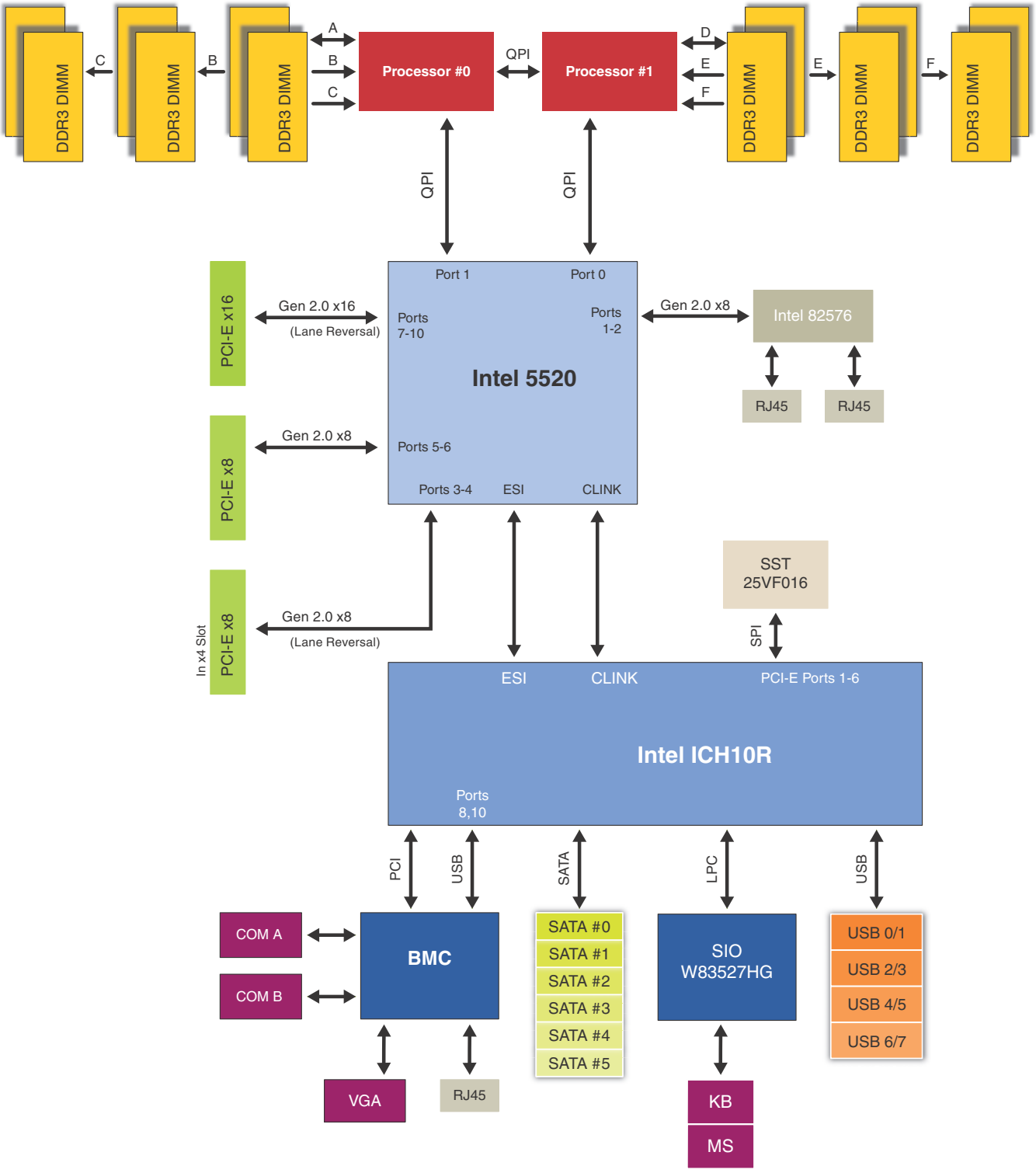


Figure 1-3. X8DTU-F Motherboard Block Diagram[a]

a—This represents a general block diagram of the X8DTU board and does not necessarily depict specific system configurations

The RES-12XR3 front panel houses three removable SATA II storage drives. Storage drive requirements should be ordered at the time of purchase. Also included on the front panel is a combination CD-RW/DVD-ROM Slimline drive, an ON/OFF power button, and system LEDs (see *Figure 1-5* on page 1-9). The rear panel contains I/O faceplates for three PCI cards (graphics, RAID, NIC, etc.), two AC power supplies with latch locks and power-cord sockets, and all I/O connectors (*Figure 1-5* on page 1-9).

Major internal components can be seen in the open top view of *Figure 1-4*, page 1-5.

Table 1-2. Major Features of RES-12XR3—Configuration 7

Feature	Details
Processor (CPU)	• Two 1366-pin Intel Quad-Core 5500-Series or Quad/Six-Core 5600-Series Xeon CPUs @ up to 6.4 GT/s each)
Chipset	• Intel® 5520 (Tylersburg) chipset • ICH10R + IOH-36D
Memory	• Twelve (12) 240-pin DIMMs supporting up to 192GB (16GB DIMMs) of Registered ECC DDR3 1333/1066/800-MHz 72-bit SDRAM
Expansion slots	• See *Table 1-1* on page 1-2 for details
Rear-Panel I/O	• See *Table 1-5* on page 1-12 for details
Peripheral Support	• Three SATA II storage drives • 1 combination CD-RW/DVD-ROM slimline (IDE) drive
Operating temperature	• 0° up to 65° C (32° up to 149°F)
Shock endurance	• 35G @ 25-msec duration (3 axis)
Dimensions	• 1.75” (1RU) high, 17” (43.2 cm) wide (19”/48.3 cm with mounting brackets), 20” (50.8 cm) deep
Rack-mount brackets and slides	• Left and right rack-mount tabs are attached to the chassis • Left and right rack-mount slides are *optional*
Dual power supplies	• 750 watts each, auto-ranging (100–265 Vac) • Load-sharing N+1 redundant, hot-pluggable • O*ptional*—Choice of 750-watt (48V) or 450/500-watt (28V) DC Power supply

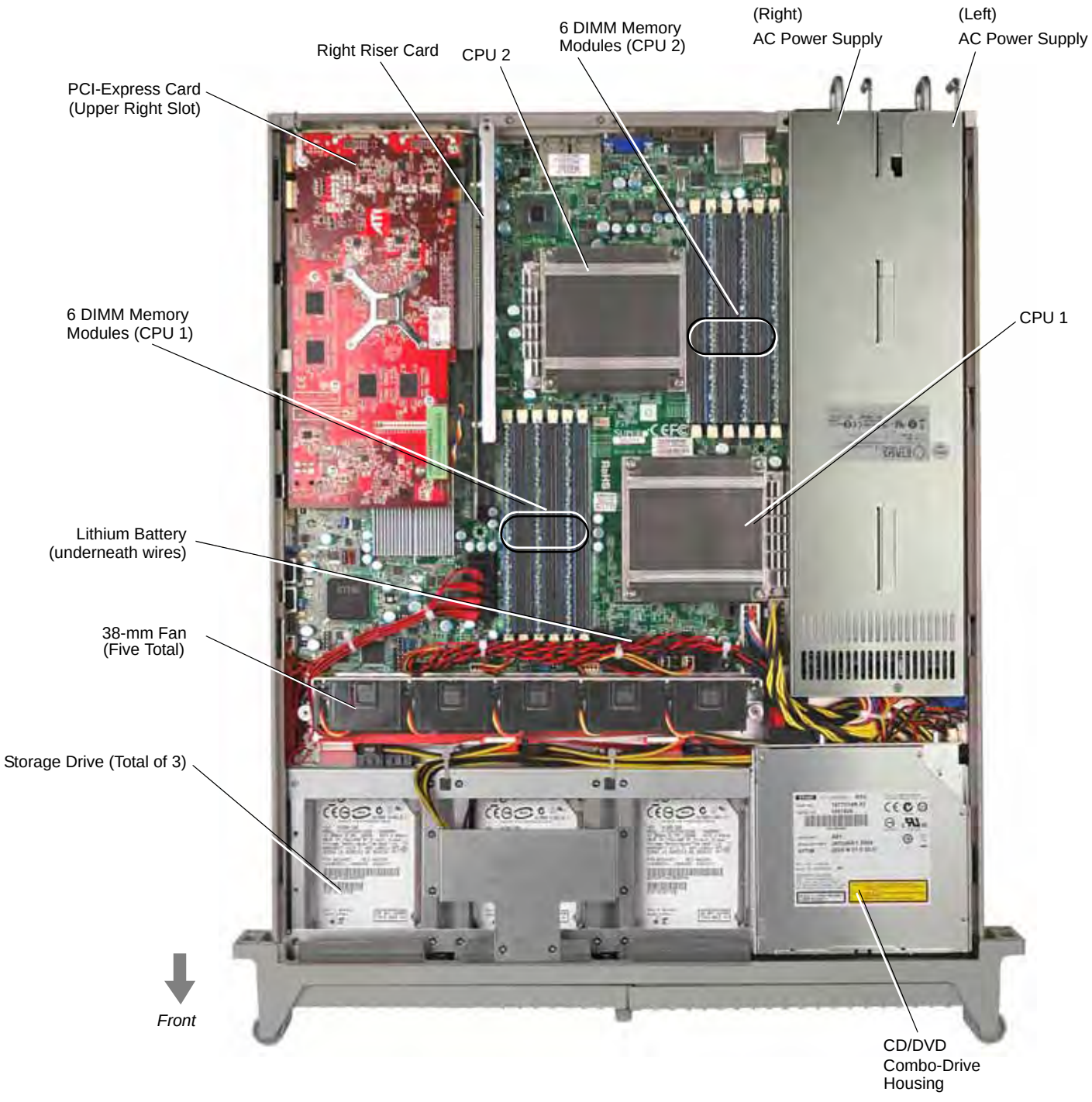


Figure 1-4. Open Top View of the RES-12XR3—Air Flow Diverter Removed

1.2 Special Features

1.2.1 Recovery from AC Power Loss

The BIOS setup can be configured to allow the system, whenever AC power is lost,

- to remain off (power switch must be pressed to turn system back on) or
- return to a power-on state automatically when power is restored.

The system default is "**`Last State`**".

1.3 PC Health Monitoring

The following sections describe the PC health monitoring features of the X8DTU-F. All have an onboard System Hardware Moni tor chip that supports PC health monitoring. An onboard voltage monitor will scan these onboard voltages continuously: CPU cores, +1.8V, +3.3V, +5V, +12V, +3.3V Standby, +5V Standby, VBAT, Memory, Chipset Voltages. Once a voltage beco mes unstable, a warning is given or an error message is sent to the screen. Users can adjust the voltage thresholds to define the sensitivity of the voltage monitor.

1.3.1 Fan Status Monitor

The RES-12XR3 has five 38- mm cooling fans and one within each power supply. The PC health-monitor utility can be used to check the RPM status of cooling fans. The onboard CPU and chassis fans are c ontrolled by Thermal Management via BIOS.

1.3.2 Environmental Temperature Control

The thermal-control sensor monitors CPU temperature in real time and will activate the thermal fan wh en CPU temperature exceeds a user-defined threshold. Overheat circuitry operates independently from the CPU, and can continue to monitor over - heat conditions even when the CPU is in sleep mode.

Once the thermal sensor detects a CPU temperature that is above the set threshold, it automatically turns on the thermal control fan to prevent overheat damage to the

CPU. In addition, onboard chassis thermal circuitry can monitor overall system temperature and alert users when chassis temperature exceeds a user-defined threshold.

Caution: To avoid possible system overheating, please be sure to provide adequate airflow to your system, and check for any possible blockages.

1.3.3 System Resource Alert

Available only through Supero Doctor III in the Windows OS environment or Supero Doctor II in Linux (an *optional* third-party product), this feature is used to notify the user of certain system events. For example, you can also configure Supero Doctor to provide you with warnings when the system temperature, CPU temperature, voltages and fan speeds go beyond a pre-defined range.

1.4 ACPI Features

Advanced Configuration and Power Interface (ACPI) defines a flexible and abstract hardware interface that provides a standard method of integrating power management features throughout the system. This includes the hardware, the operating system, and the application software. As a result, the system can automatically turn peripherals (CD-ROMs, NICs, storage drives, and printers, for example) on or off. This includes any consumer devices that may be connected to the system (VCRs, TVs, telephones, and stereo systems, for example).

In addition to providing operating-system power management, ACPI offers a generic system event mechanism for Plug and Play and an operating- system-independent interface for configuration control. Plug-and-Play BIOS data structures are leveraged, while the implementation is processor-architecture-independent and compatible with both Windows 2003 and Windows 2008 Operating Systems.

1.4.1 Slow Blinking LED for Suspend-State Indicator

When the CPU enters a suspend state, the `Power` LED will start blinking to indicate that the CPU is in suspend mode. Pressing any key on the keyboard will awaken the CPU, at which time the power LED will stop blinking and remain on.

1.5 Super I/O

The Super I/O supports two high-speed,16550 compatible serial communication ports (UARTs). Each UART includes a 16-byte send/receive FIFO, a programmable baud rate generator, complete modem control capability and a processor interrupt system. Both UARTs provide legacy speed with baud rate of up to 115.2 Kbps as well as an advanced speed with baud rates of 250 K, 500 K, or 1 Mb/s, which support higher speed modems.

The Super I/O provides functions that comply with ACPI (Advanced Configuration and Power Interface), which includes support of legacy and ACPI power management through an SMI or SCI function pin. It also features auto power management to reduce power consumption.

1.5.1 Overview of the Winbond WPCM450 Controller

The Winbond WPCM450 Controller is a Baseboard management Controller (BMC) that supports the 2D/VGA-compatible Graphics Core with the PCI interface, Virtual media, and keyboard/Video/Mouse Redirection (KVMR) modules. With blade-oriented Super I/O capability built-in, the WPCM450 Controller is ideal for legacy-reduced server platforms.

The WPCM450 interfaces with the host system via a PCI interface to communicate with the Graphics core. It supports USB 2.0 and 1.1 for remote keyboard/mouse/virtual media emulation. It also provides LPC interface to control Super I/O functions. The WPCM450 is connected to the network via n external Ethernet PHY module.

The WPCM450 communicates with onboard components via six SMBus interfaces, fan control, and Platform Environment Control Interface (PECI) buses.

Note: For more information on IPMI configuration, please refer to the Embedded IPMI User's Guide posted @ http://www.supermicro.com/support/manuals/

1.6 System LEDs and I/O Connectors

All RES-12XR3 system LEDs are located on the front panel (see **A**, *Figure 1-5*, page 1-9); all I/O connectors are located on the rear panel (see **B**, *Figure 1-5*). LEDs are described in *Table 1-4* on page 1-11; I/O connectors are described in *Table 1-5*, page 1-12.

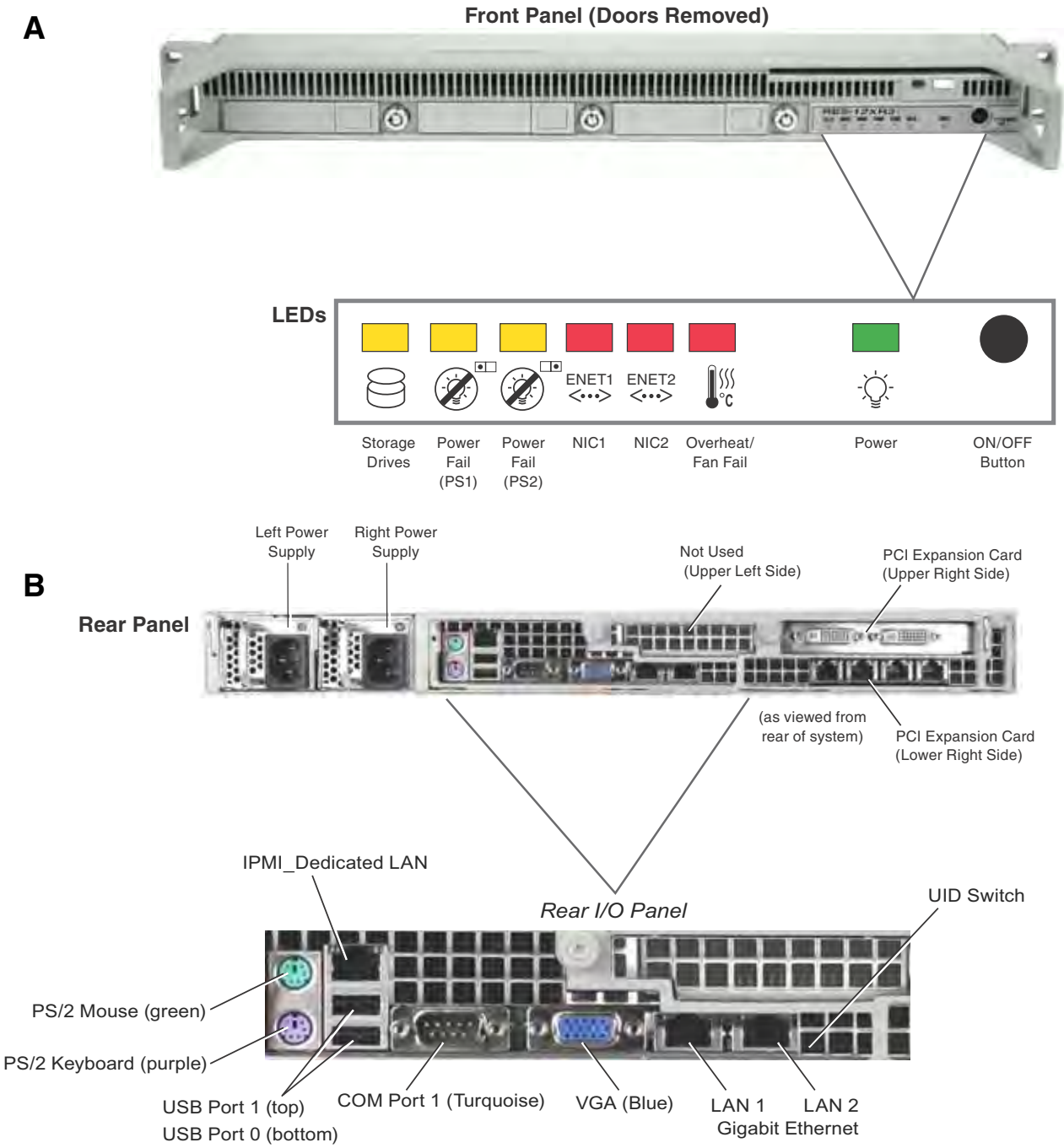


Figure 1-5. RES-12XR3 System LEDs and I/O Connectors (X8DTU-F Motherboard)

Table 1-3. Power Supply LED Behavior

Symbol	LED Power	System LED	Description
	On (red LED)	Power Fail LED (Left Power Supply) Note: system is powered on	• If system is powered on, warns that the upper power supply has failed or has lost AC input.
	On (red LED)	Power Fail LED (Right Power Supply) Note: system is powered on	• If system is powered on, warns that the lower power supply has failed or has lost AC input.
 And 	Off	Power Fail LED (Left & Right Power supply) Note: system is powered on	• System is powered on and power supply modules are functioning normally, or system has been shut down and there has been no interruption to the AC power.
 Or 	On (red LED)	Power Fail LED (Left or Right Power Supply)[a] Note: system is powered off	• AC power has been interrupted to both power supply modules. When power is restored but system is still off, one of the two indicator lights will be lit.
Rear Power Supply Modules	On (green LED)	Green LED (adjacent to AC input) Note: system is powered on	• System is receiving DC power (3.3V, 5V, 12V) from the power supply module
	Off[b]	Green LED (adjacent to AC input) Note: system is powered off	• System is off and not receiving DC power from the Power Supply module.

a—This LED behavior indicates only that AC power has interrupted to both power supplies, and does not indicate which power supply module lost power first, or regained power first.

b—This LED behavior indicates that DC power is not being used, and the system is off. It does not indicate a loss of AC power to the power supply module.

Table 1-4. System LEDs

Symbol	LED	Description
	Power	● Indicates that the system is turned on.
	Storage Drive	● Indicates SAS/SATA II storage-drive activity.
	NIC1[a] (Gb Ethernet)	● Indicates network activity on LAN 1.
	NIC2 (Gb Ethernet)	● Indicates network activity on LAN 2.
	Overheat/Fan Fail —Normally OFF —RED light when temperature limits are exceeded	● Warns that the system is exceeding specified temperature parameters. The CPU overheat warning function must be enabled in the BIOS, thus allowing the user to define an overheat temperature, which—when exceeded—triggers the overheat warning LED.
Symbol	**Rear Panel LED(s)**	**Description**
N/A	LAN1 and LAN2	Each Ethernet port contains two LEDs: ● The color of the left LED (when facing the port) indicates the LAN connection speed: - Off = 10 MHz - Green = 100 MHz - Amber = 1 GHz ● The right LED, when lit, indicates LAN activity.

a—NIC = Network Interface Controller.

Table 1-5. Rear-Panel I/O Connectors

Connector	Description
PS/2 Mouse	• 6-pin mini-DIN connector to attach a PS/2 mouse device.
PS/2 Keyboard	• 6-pin mini-DIN connector to attach a PS/2 keyboard device.
USB 0 and USB 1 Hi-Speed USB 2.0 Serial Ports	• Two 4-pin USB connectors to attach serial devices to USB port 0 and USB port 1. *Note:* Six additional USB ports (USB 2 through USB 7) can be accessed directly from the motherboard.
COM 1 Serial Port	• One DB9 (male) connector on rear panel to attach a serial device to COM 1port A second serial port (COM 2) can be accessed directly from the motherboard.
VGA Graphics Connector	• One 17-pin VGA connector to provide a video and CRT display
Ethernet LAN Ports	• Standard RJ45 connector to attach one or two gigabit Ethernet LAN line(s)—LAN 1 and LAN 2.
IPMI Dedicated Ethernet LAN Port	• Standard RJ45 connector to attach a dedicated IPMI LAN line with full KVM support.
Unit Identifier (UID) Switch	• A Unit Identifier Switch and two LED indicators are located on the motherboard. When the UID switch is pressed, both LEDs are turned on (one LED is located at the rear edge of the motherboard, the other LED is at the front of the motherboard). Pressing the UID again turns off both LED indicators. The UID indicators provide an easy identification of a system unit that may be in need of service. *Note:* The UID can also be triggered via IPMI.

1.7 Chipset Overview

Built upon the functionality and capabili ty of the Intel 5520 platform, RES-12XR3 Configuration 7 provides the performanc e required for dual processor -based high-end systems, including optimal configuration options for communications, high-end CAD systems, or database applicati ons. Configuration 7 supports up to two quad/six-core 5600-series or two quad-core 5500-series intel 64-bit Xeon processors with a QPI up to 6.4 GT/s. The Intel chipset consists of:

- the Intel 5520 (Tylersburg) chipset, and
- the ICH1 OR + IOH-36D

With the Intel QuickPath Interconnect (QP I) controller built in the processor, the 5500 Series Processor platform is the first dual-processing platform to offer the next-generation point-to-point system interconnect interface, replacing current Front Side Bus Technology and providing substantial system performance enhancement by utilizing serial link interconnections, allowi ng for increased bandwidth and scalability.The IOH connects to each proce ssor through an independent QuickPath Interconnect link. Each link c onsists of 20 pairs of unid irectional differential lanes for transmission and receiving in addition to a differential forwarded clock. A full-width QuickPath interconnect link pair provides 84 signals. Each processor supports two QuickPath links, one going to the other processor and the other to the 5520 chip.

The 5520 chipset supports up to 36 PCI Express Gen2 lanes, peer-to-peer read and write transactions. The ICH10R provide s up to 6 PCI-Express ports, three SA TA ports and two USB connections. In additi on, the Intel 5520 platform also of fers a wide range of RAS (Reliability, Availability and Serviceability) features. These features include memory interface ECC, x4,/x8 Single Device Data Correction (SDDC), Cyclic Redundancy Check (CRC), parity protection, out-of-band register access via SMBus, memory mirroring, memory sparing, and Hot-plug support on the PCI-Express Interface.

1.7.0.1 Main Features of the 5500 Series Processor and 5520 Chipset

- Four (5500) to six (5600) processor cores in each CPU with 8MB shared cache among cores
- Two full-width Intel QuickPath interconnect links, up to 6.4 GT/s of data transfer rate in each direction
- Virtualization Technology, Integrated Management Engine supported
- Point-to-point cache coherent interconnect, Fast/narrow unidirectional links, and Concurrent bi-directional traffic
- Error detection via CRC and Error correction via Link level retry

1.8 Specifications

1.8.1 General

Table 1-6 lists general specifications for the RES-12XR3.

Table 1-6. RES-12XR3 General Specifications

Parameter	Description
Dimensions	• 1.75” (1RU) high • 17” (43.2 cm) wide (19” rack-mountable) • 20” (50.8 cm) deep
Weight	• Approximately 19.5 pounds (8.9 kg); includes 2 full-length (up to 12.25”) PCI cards, 1 CD-RW/DVD-ROM drive, 2 CPUs, 6 DIMMs, 2 SATA storage drives, and 2 power supplies • Add 8.8 pounds (4 kg) for the shipping container and two AC power cords • The manual and associated shipping paperwork weighs approximately 1 lb (0.5 kg)
19” Rack-Mountable with Slide capability	• Left and right rack-mount tabs attached to chassis • Left and right rack-mount slides are *optional*
Temperature[a] Operating: Non-Operating:	 • 0° up to 65° C (32° up to 149°F) • –40° to 70° C (–40° to 158° F)
Relative Humidity[a] Operating: Non-Operating:	 • 8% to 95% (non-condensing) • 5% to 95% (non-condensing)
Maximum Wet Bulb[a] Operating: Non-Operating:	 • 163°C, non-condensing • 180°C, non-condensing
Altitude[a] Operating: Non-Operating	 • 0 to 10,000 feet above sea level • 0 to 40,000 feet above sea level

a—Specifications are dependent on the configurations in this manual.

1.8.2 Electrical

Table 1-7 lists the electrical specifications for the RES-12XR3.

Table 1-7. RES-12XR3 Electrical Specifications

Parameter	Description		
	AC (120 volts, 750W)	**DC (48 volts, 750W)**	**DC (28 volts, 500W)**
Input Power (*typical*)	• 420 watts (*typical*)[a]	• 420 watts (*typical*)[a]	• 450 watts (*typical*)[a]
Input Current	• 3.5 amperes @120 Vac	• 13.5 amperes @48 Vdc	• 16 amperes @28 Vdc
Input Frequency	• 47-63 Hertz	*NA*[b]	*NA*[b]
Input Voltage	• 100–265 Vac, internally fused	• 40–72 Vdc, internally fused	• 18–36 Vdc, internally fused
Input VA Rating	• 425 VA	*NA*	*NA*
BTU Rating	• 1447 BTU/hour	• 1447 BTU/hour	• 1447 BTU/hour
Power Factor	• 0.99	*NA*	*NA*
Input Leakage Current	• 3.5 mA	*NA*	*NA*
Plug Type	• IEC	• Y-Type (SVS5-4 or equivalent)	• Y-Type (SVS5-4 or equivalent)

a—Does not include plug-in PCI cards.

b—NA = Not Applicable.

1.8.2.1 System Power

The RES-12XR3 operates with two N+1 redundant power supplies of 750-watts capacity each that auto-range single-phase AC input from 100 to 265 Vac (47 to 63 Hertz) sources. Filtered and fused (internal) AC is supplied to each power supply from a rear-mounted power connection.

Two *optional* N+1 redundant DC power supplies of 750 watts (48 volts) or 500 watts (28 volts) each may be substituted for the AC power supplies (see *Table 1-7*). These supplies should be specified at the time of your order.

Note: Some AC RES systems may be installed with **650-watt** instead of **750-watt** power supplies, which should not effect the performance of the system.

1.8.2.2 Output Voltage

The RES-12XR3 power supply provides output voltages that are split between +3.3V, +5V, +$5V_{sb}$, +12V, and -12V rails.

1.8.3 Environmental

1.8.3.1 Shock

The RES-12XR3 is designed to survive an elevated shock environment. All structural components are welded together , enabling the system to survive a maximum 3-axis shock load of 35G at 25-ms duration.

1.8.3.2 Electrostatic Discharge

The RES-12XR3 is designed to tolerate electrostatic pulses up to 15 kilovolts (KV) with no impact on system operation.

1.8.3.3 Noise

The RES-12XR3 conforms to the 54-db noise specification

Note: All RES systems are shipped with BIOS fan speed set to the quietest mode. The default fan speed control mode of the RES-12XR3 Configuration 7 is **Energy Saving/ES.**

1.9 Packaging and Shipping

The RES-12XR3 is packaged in a reusable shipping container. Approximate weight of an empty container and two AC power cords is 8.8 pounds (4 kg).

The approximate weight of a RES-12XR3 (loaded with two storage drives, two PCI cards, a CD-RW/DVD-ROM drive, two CPUs, 6 DIMMs, and two power supplies) is approximately 19.5 pounds (8.9 kg).

The approximate weight of a manual and associated shipping paperwork is one pound (0.5 kg).

Therefore, both the shipping container and a fully installed RES-12XR3 including power cords, manual, and associated paperwork, weigh under 30 pounds (13.5 kg).

Caution: **Do not discard the original packaging** that your system was shipped in.

When sending the RES-12XR3 back to Themis for any reason, the original shipping container must be used, packed exactly as described in Appendix F, "Repackaging Instructions". To ship the RES-12XR3 without following the procedures outlined in Appendix F **may invalidate the warranty**.

1.9.1 Accessory Kit

Each RES-12XR3 is packaged with an Accessory Kit, consisting of the following items:

A. A Power-cord Retainer Bracket

B. Two AC Power Cords

C. Two Front-Bezel Barrel Keys

When you unpack the RES-12XR3, please verify that all of these items are included. If any of these items are missing or not as pictured, please call Themis Technical Support at 510-252-0870, or send an email to support@themis.com.

To learn how to secure the AC power cords and the power-cord retainer bracket, refer to Section 2.3.1, "Plugging in the AC Power Cords," on page 2-20.

1.9.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-12XR3 for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and can be ordered at the time of purchase.

To learn how to install rack-mount slides, refer to Appendix B, "Rack-Mount Slide Installation".

Table 1-8. Approximate Weights of the RES Series

Model	Weight (Approximate)	CPU Sockets	Depth	Description
RES-12XR3	19.5 lbs (8.9 kg)	2	20"	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-12XR3-S	17 (7.7 kg)	2	17"	
RES-11XR3	16.5 lbs (7.5 kg)	1	17"	
RES-22XR3	25 lbs (11.4 kg)	2	20"	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-22XR3-S	23 lbs (10.4 kg)	2	17"	
RES-22XR3/FIO	25.3 lbs (11.5 kg)	2	16"	
RES-21XR3	22.5 lbs (10.2 kg)	1	17"	
RES-32XR3	28.5 lbs (12.9 kg)	2	20"	Includes: ● All CPU sockets filled ● 6 DIMMs ● 2 storage drives ● 2 PCI cards ● 1 CD-RW/DVD-ROM drive ● 2 power supplies
RES-32XR3-S	26.5 lbs (12.0 kg)	2	17"	
RES-32XR3/FIO	29.0 lbs (13.2 kg)	2	16"	
RES-31XR3	26 lbs (11.8 kg)	1	17"	

Installation Section

Chapter 2

Installation and Operation

This chapter describes:

- How to install a memory module, st orage drive, PCI card, 38-mm-fan, power supply, and lithium battery
- Rack-mount brackets
- How to turn the RES-12XR3 on and off

2.1 Installation Procedures

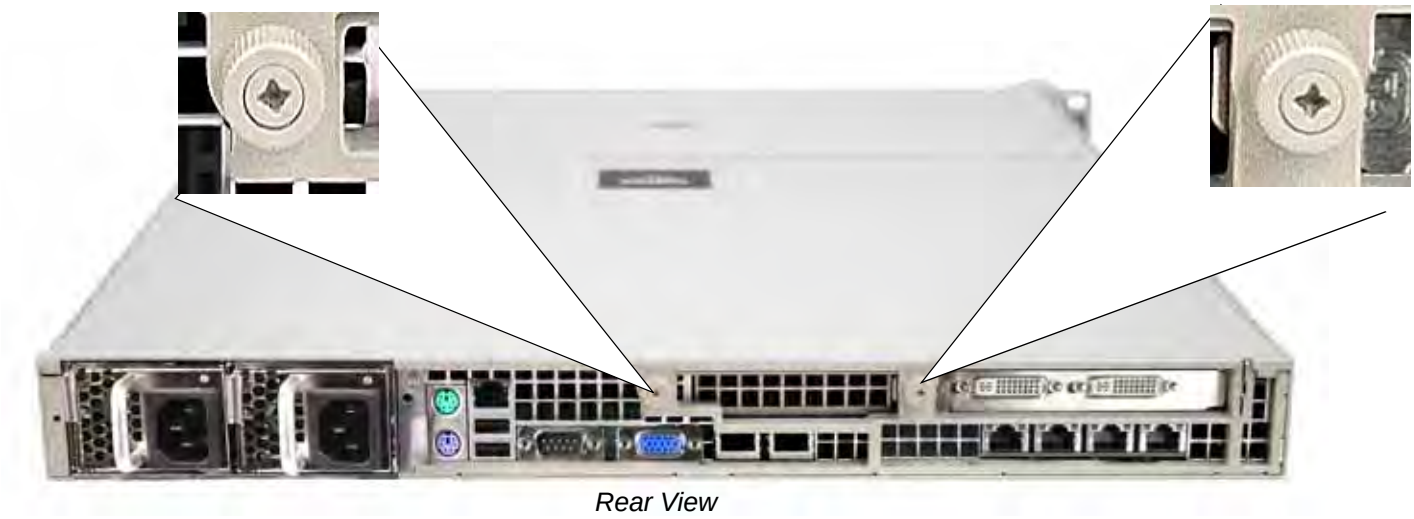
Caution: Use industry-standard ESD groundi ng techniques when handling all components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface. **Handle all IC cards by the front panel or edges only.**

To install or replace a SATA-II **storage drive**, **fan**, or **power supply**, skip the next section and proceed directly to page 2-12, page 2-15, or page 2-17, respectively . Replacement of motherboard components requires removal of the protective cover.

2.1.1 Remove Protective Top Cover

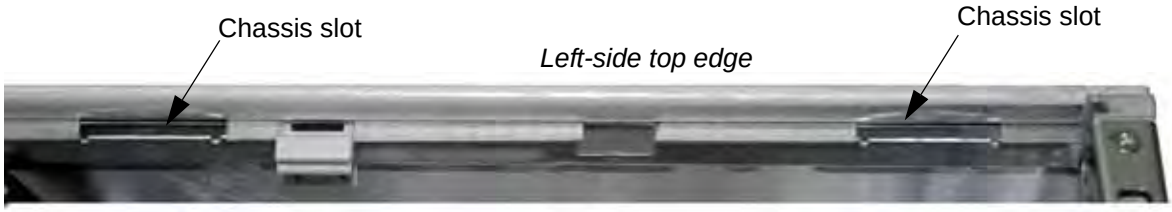
To access a motherboard component, open the RES-12XR3 as follows:

1. Loosen the two captive Phillips screws holding the protective top access cover to the rear of the RES-12XR3 chassis (see **A**, *Figure 2-1*).
2. Both the front and sides of the cover have flat hooks or tabs underneath that fit under slots on the chassis top edges (see **B**, *Figure 2-1*). Remove the cover by sliding it toward the rear until it is free of these chassis slots.
3. Store the cover in a safe place until it is replaced.



Rear View

A Loosen the 2 captive access-cover screws…



B … and slide the top cover toward the rear until the top hooks and tabs clear all chassis slots

Figure 2-1. Remove the RES-12XR3 Protective Access Cover

4. Proceed to the appropriate section to install or replace a **memory module** (page 2-3), **PCI card** (page 2-6), or **lithium battery** (page 2-11).

2.1.2 Memory Modules

The RES-12XR3 supports memory according to *Table 2-1*. Note the total memor y capacity varies according to the motherboard installed in the RES-12XR3.

Table 2-1. RES-12XR3 Memory Capacity

Motherboard	Memory Parameters				
	Capacity	DDR3 Registered ECC	Speed (MHz)	Number of DIMMS	Pins per DIMM
X8DTU-F	192 GB	Yes	1333/1066/800	12	240

Caution: Exercise extreme caution when in stalling or removing FBD Memory Modules to prevent any possible damage.

Table 2-2. RES-12XR3 Optimal Memory Population (CPU1 Installed)

DIMMs	Branch 0		Branch 1		Branch 2	
3 DIMMs	P1 DIMM 1A		P1 DIMM2A		P1 DIMM3A	
6 DIMMs	P1DIMM1A	P1 DIMM1B	P1DIMM2A	P1 DIMM2B	P1 DIMM3A	P1 DIMM3B

Table 2-3. RES-12XR3 Optimal Memory Population (CPU2 Installed)

DIMMs	Branch 0		Branch 1		Branch 2	
3 DIMMs	P2 DIMM1A		P2 DIMM2A		P2 DIMM3A	
6 DIMMs	P2 DIMM1A	P2 DIMM1B	P2 DIMM2A	P2 DIMM2B	P2 DIMM3A	P2 DIMM3B

Table 2-4. RES-12XR3 Optimal Memory Population (CPU1/CPU2 Installed)

DIMMs	CPU 1						CPU 2					
	Branch 0		Branch 1		Branch 2		Branch 0		Branch 1		Branch 2	
6 DIMMs	1A		2A		3A		1A		2A		3A	
12 DIMMs	1A	1B	2A	2B	3A	3B	1A	1B	2A	2B	3A	3B

When installing memory, follow these rules for best memory performance:

- It is strongly recommended that you *do not mix memory modules* of different speeds and sizes. If DIMMs of different speeds have been installed, verify that the BIOS setup is configured for the fastest speed of RAM used.

2.1.2.1 Installation

The following procedure explains how to install the DDR3 FBD Memory Modules.

1. Loosen and remove the seven screws securing the air-flow deflector (see *Figure 2-2*).

Figure 2-2. Remove RES-12XR3 Air-Flow Deflector

2. After the air-flow deflector is removed the memory modules will be exposed (see *Figure 1-4* on page 1-5).

The following procedure explains how to install the DDR3 FBD Memory Modules...

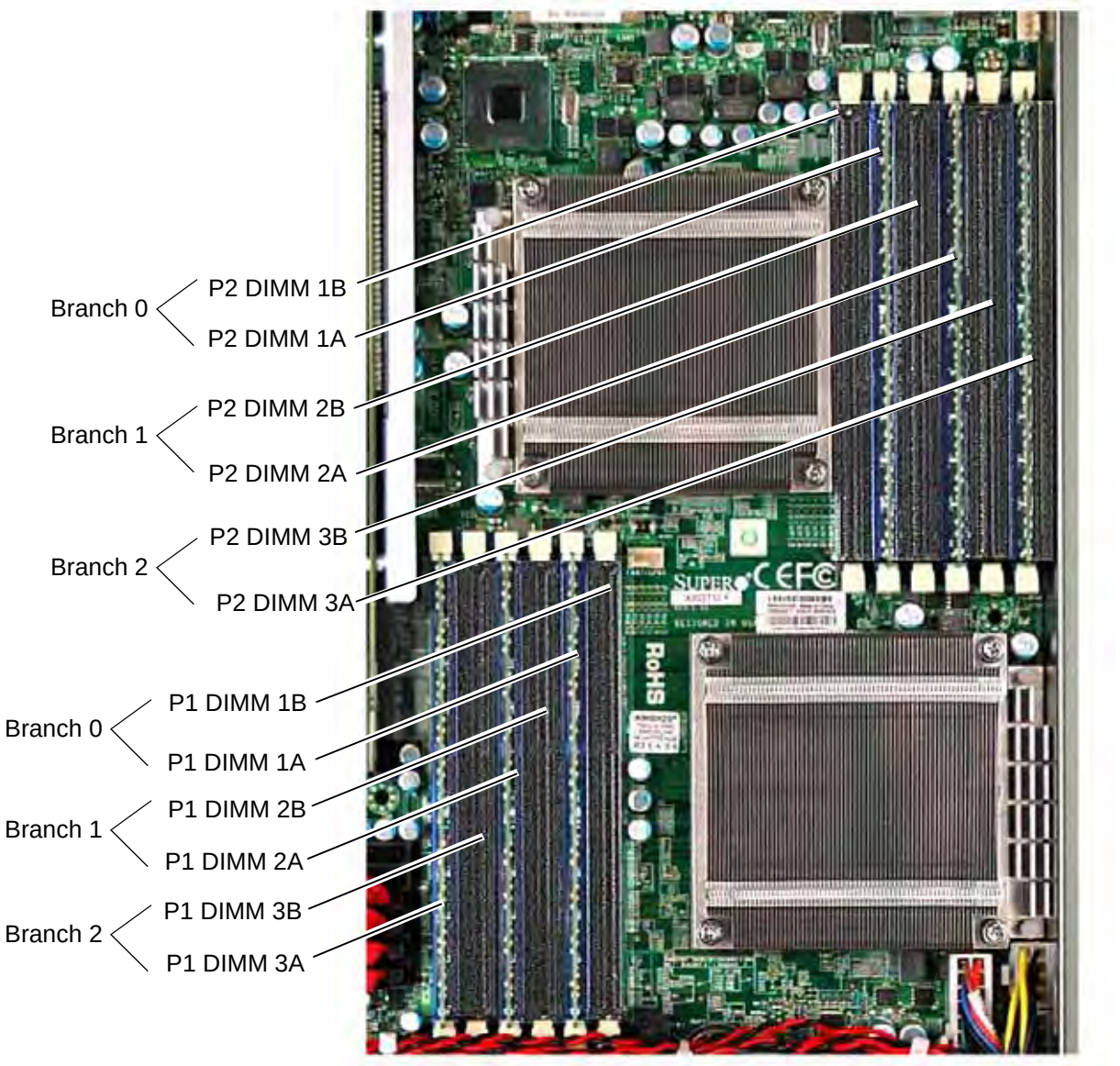


Figure 2-3. Memory Module Slot Locations (X8DTU-F Motherboard)

1. If a module is already seated in the slot you have selected for installation, remove it by gently pressing down and outward on the latches at both ends of the slot (see *Figure 2-4* on page 2-6), then pulling the old module directly up from the slot until it is free of the connector (see *Figure 2-4*).

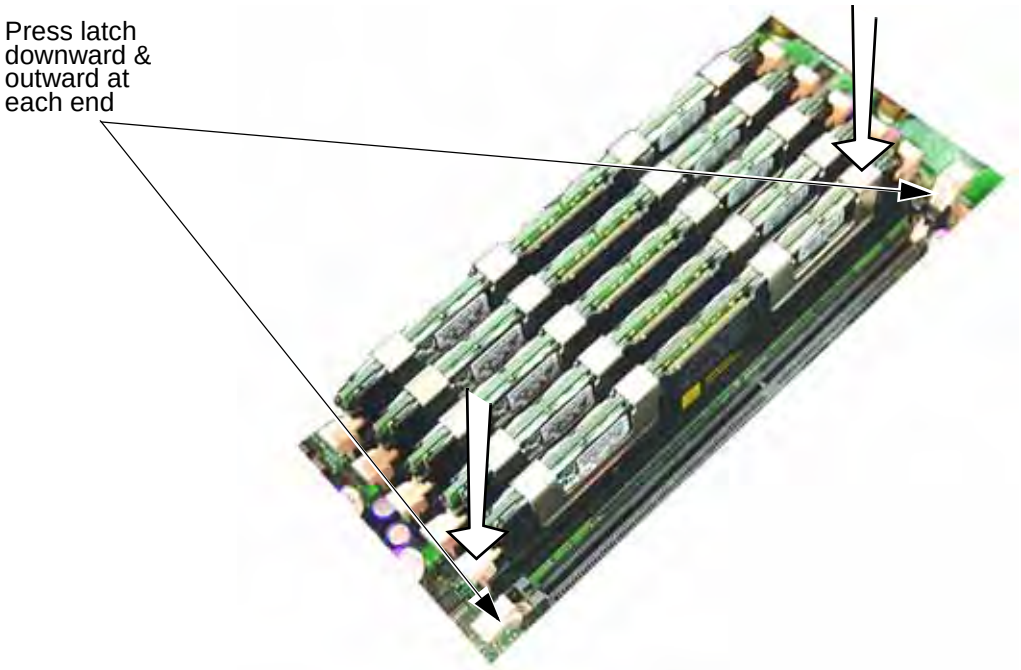


Figure 2-4. Memory Module Removal

2. Before inserting a new memory module in to the vacant slot, make sure that the two latches are pulled outward away from the center of the slot.

With the latches in the outward position, gently insert the new module vertically into its slot and press firmly downward until it snaps into place.

Note: Make sure the memory module has the proper orientation by aligning the alignment notch at the bottom edge with its counterpart ridge at the bottom of the slot.

3. If all the memory modules have been re placed in the system, replace the air flow diverter and secure it with the eight screws previously removed.

4. Replace the PCI card retainer bracket and secure it with the single screw removed in Step 1 on page 2-9.

2.1.3 PCI Cards

Since the RES-12XR3 is only 1RU (1.75”) high, PCI cards must be installed horizontally through one of the two PCI Riser Cards (see *Figure 2-5* on page 2-7).

Configurations include:

- **Slot J1–SXB2**: 1 PCI-Express 2.0 x8 (left PCI slot on left Riser Card)—slot is not used, call Themis Customer Service for further information
- **Slot J2–SXB1**: 1 PCI-Express 2.0 x16 (upper-right PCI slot, right Riser)
- **Slot J3–SXB3**: 1 PCI-Express 2.0 x8 in x4 slot (lower-right PCI slot)

The upper-right PCI slot supports cards up to 12.28-inches long; the lower-right PCI slot supports shorter cards (due to space constraints from the CPU and related heat sink, the left PCI slot is not usable). A list of recommended PCI Riser Cards is shown in *Table 2-5*, page 2-8. PCI Riser Cards that are installed on the RES-12XR3 motherboard depend on the type of PCI card that will be supported.

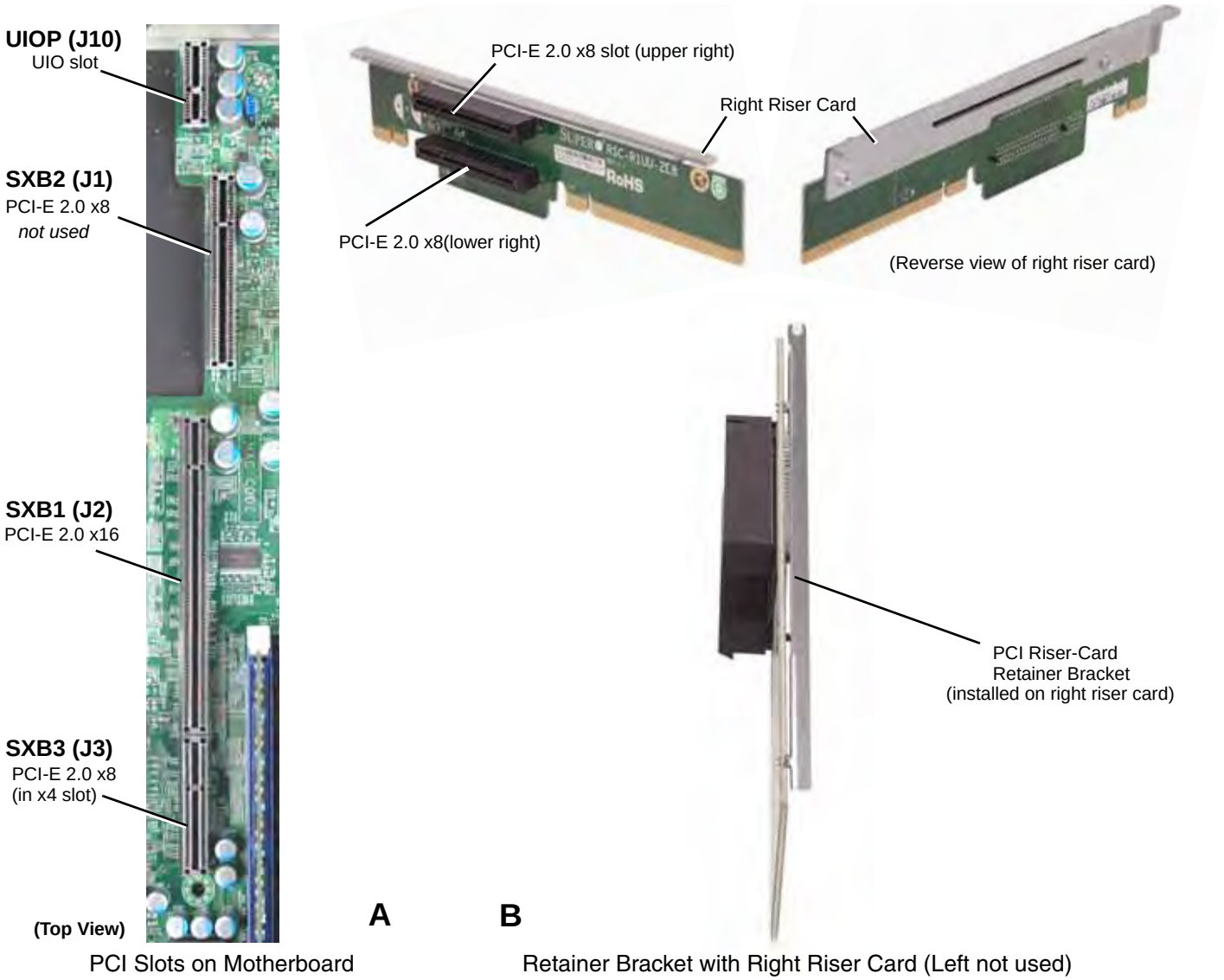


Figure 2-5. Positioning of the RES-12XR3 PCI/UIO Riser Cards

Table 2-5. 1RU Riser Cards Available for the X8DTU-F Motherboard[a]

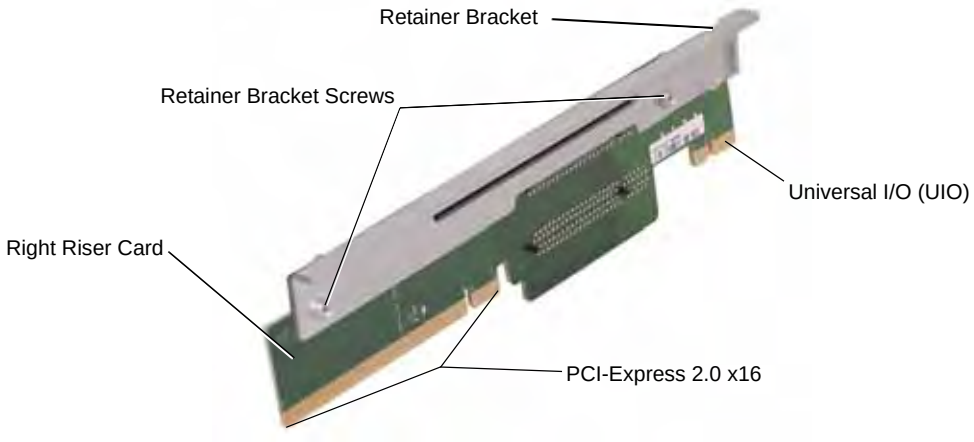
Riser Card Part Number	XR3 Box	Riser Card Output Slots			
		UIO	PCI-E x8	PCI-E x16	PCI-X
RSC-R1UU-E16	• RES-12XR3 • RES-22XR3	—	—	1	—
RSC-R1UU-2E8	• RES-12XR3 • RES-22XR3	—	2	—	—
RSC-R1UU-AXE8	• RES-12XR3 • RES-22XR3	—	1	—	1
RSC-R2UU-A4E8	• RES-22XR3 • RES-22XR3-FIO	—	4[b]	—	—
RSC-R2UU-A3XE8	• RES-22XR3 • RES-22XR3-FIO	—	1	—	3[c]
Themis Custom	• RES-22XR3 • RES-22XR3-FIO	—	—	2[d]	—
RSC-RR1U-E16	• RES-11XR3 • RES-21XR3	—	—	1	—

a—This list includes the most popular Riser Cards. Call Themis Customer Service for a list of other Riser Cards that are available.

b—Can't use top slot, therefore 3 x8

c—Can't use top slot, therefore 2 PCI-X

d—One x16, one x16 in x8 slot



Note: P/N of Riser Card shown = RSC-R1UU-UE16

Figure 2-6. PCI Riser Cards are attached to a Retainer Bracket …

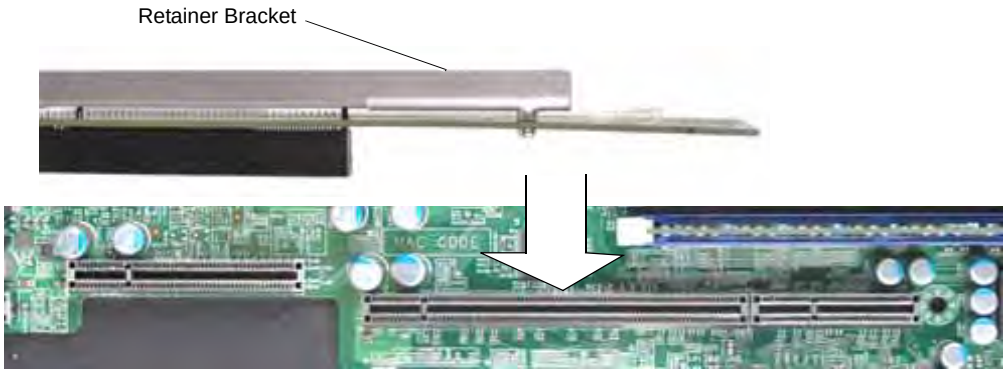


Figure 2-7. Then inserted into the PCI slots of the Motherboard

2.1.3.1 Installing Cards

Right PCI Riser Card: Perform the following steps to install a right-hand PCI card:

1. Locate the slot on the riser card (see *Figure 2-5* on page 2-7) within which a card will be installed and remove the Phillips screw or tape holding the blank I/O faceplate corresponding to the slot (see *Figure 2-8*).
2. Remove the blank I/O faceplate corresponding to the slot.

Note: Call Themis Technical Support if there is a question on how to secure the PCI I/O faceplate to the rear I/O panel.

3. Carefully install each PCI card (lower-right card first) into the appropriate slot until all expansion cards have been installed. securing its I/O faceplate to the rear I/O panel—if permitted—with the Phillips screw or tape removed in Step 1. Secure the side edge of each card according to the following instructions:

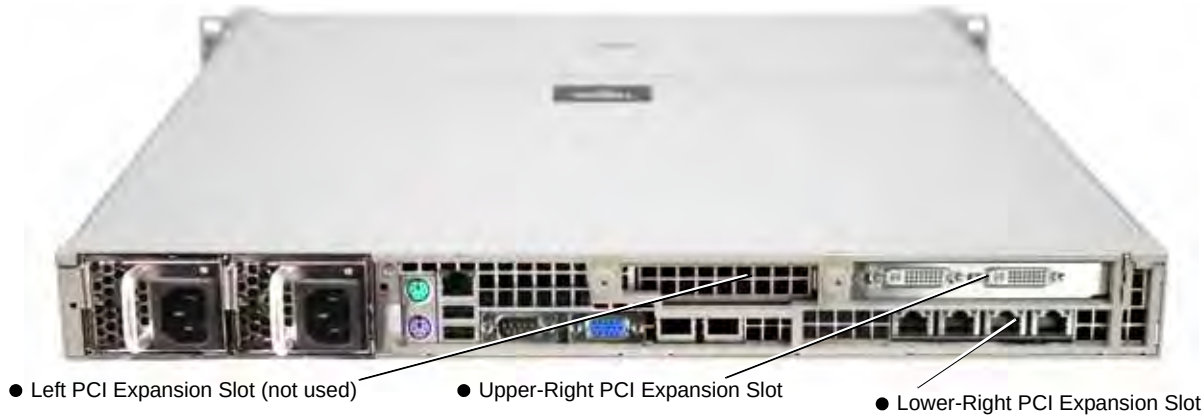
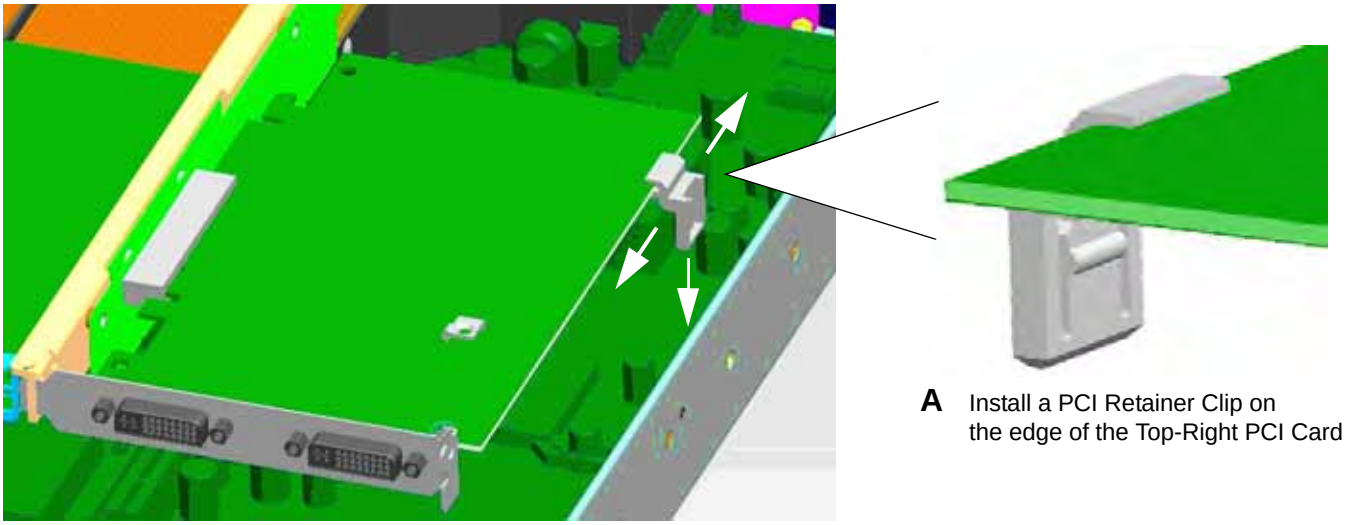


Figure 2-8. The RES-12XR3 has Three PCI Expansion Slots

Lower-Right PCI Expansion Slot—Themis has provided a pair of threaded standoffs to secure the card installed in the lower-right PCI expansion slot to the motherboard. Remove the standoff screws, install the PCI card into the lower-right slot, and secure the PCI card with the standoff screws.

Upper-Right PCI Expansion Slot—After installing the upper -right PCI expansion card, install a PCI Retainer Clip—two if necessary—that was shipped with your order onto the edge of the PCI card (see **A**, *Figure 2-9* on page 2-10), and slide it along the edge until it is positioned over one of the several slots along the top edge of the RES-12XR3 chassis (see **B**, *Figure 2-9*). Press down firmly on the clip until it snaps into position.



A Install a PCI Retainer Clip on the edge of the Top-Right PCI Card.

B Slide the Retainer Clip along the edge of the Top-Right PCI Card until it is over a chassis slot, then press firmly into slot.

Figure 2-9. Installation of the PCI Card Retainer Clip

Caution: Be careful not to install a PCI Retainer Clip into one of the longer chassis slots used to secure the top cover of the RES-12XR3.

4. Attach any internal I/O cables to the installed PCI cards, and carefully fold and tuck any exposed ribbon cables into the cabinet.
5. If you have no further installations to perform, close the RES-12XR3 chassis by refastening the top cover removed in Step 1 on page 2-2.
6. Attach all external cables to the I/O faceplates of the installed PCI/UIO cards.

2.1.4 Lithium Battery

2.1.4.1 Removing the Lithium Battery

Perform the following steps to remove the lithium battery:

1. Make sure the system is powered off (see "Operation" on page 2-20).

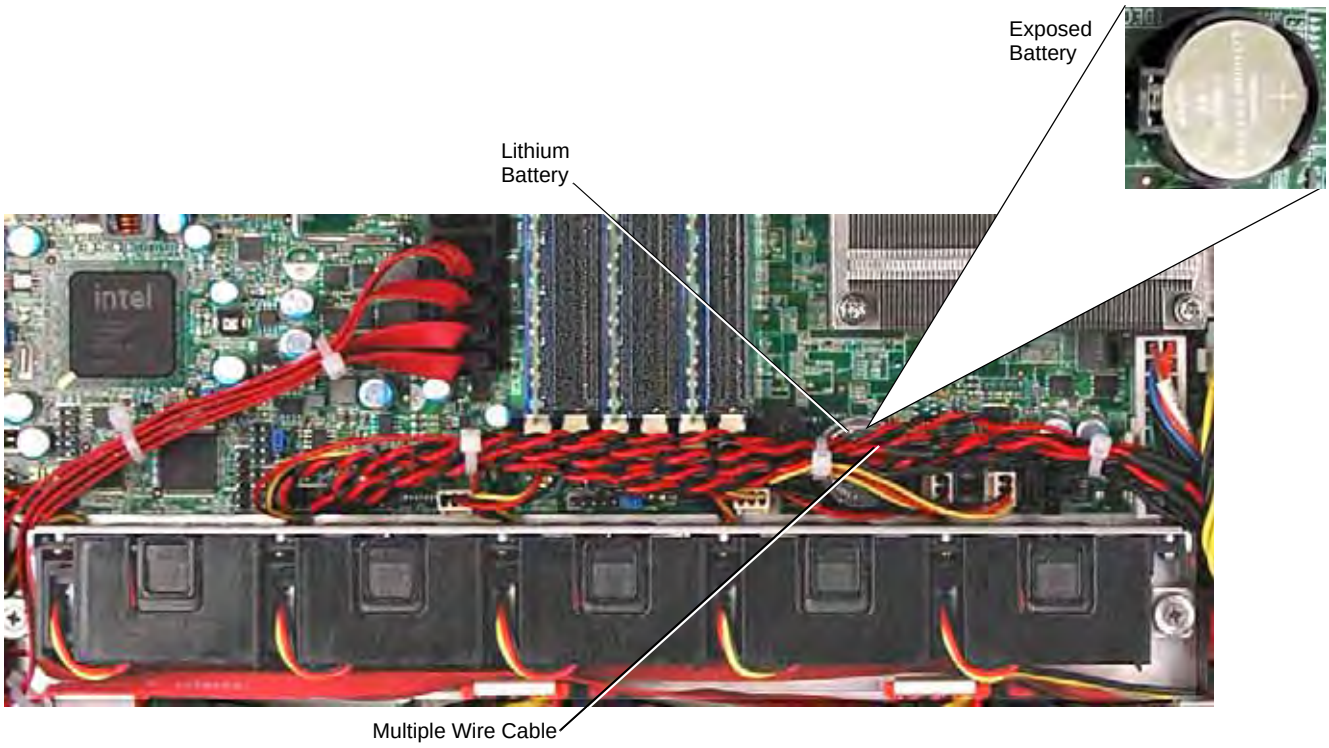


Figure 2-10. The RES-12XR3 Lithium Battery and Multiple Wire Cable

2. If you cannot access the lithium battery directly, you must move and/or detach the multiple wire cable routed over the battery (see *Figure 2-10*).
3. Locate the lithium battery socket and squeeze the latch (see **A**, *Figure 2-11* on page 2-12) together until the battery lifts out of its socket.

Note: The battery location is dependent on which motherboard is installed in the chassis. *Figure 2-10* shows the location of the battery on the X8DTU-F Motherboard.

4. Remove the old battery and replace with a new battery (see *Figure 2-11*).

A To release, squeeze the battery latch together… **B** … and remove the battery from socket

Figure 2-11. The RES-12XR3 Lithium Battery and Socket

2.1.4.2 Installing a Lithium Battery

Perform the following steps to insert a new lithium battery:

1. Tilt the replacement battery into the empty socket so that it is angled under the battery latch (see **B**, *Figure 2-11*).
2. Carefully press down on the battery until it clicks firmly into place.

2.1.5 SATA II Storage Drive

Perform the following steps to remove and install a SATA II storage drive.

Note: For SATA II drives, the left-hand removable storage drive (SATA II ID0) is designated as the boot drive.

The front bezel (door) of the RES-12XR3 must be unlocked and opened to access the SATA II storage drives.

2.1.5.1 Opening the RES-12XR3 Front Doors

To access the removable storage drives, you must first open the front doors (see *Figure 2-12*, page 2-13). The knurled captive sc rew on the front of the RES-12XR3 allows the doors to lock without a key . To unlock the front doors, turn the screw counterclockwise and pull both bezel doors away from the chassis.

The accessory kit shipped with your RES-12XR3 contains two barrel lock keys. This provides you the option of unlocking/locking the storage drives.

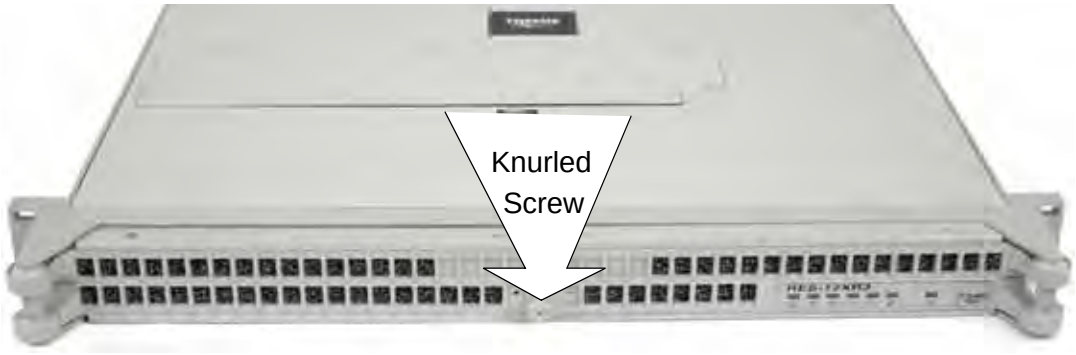


Figure 2-12. Opening the RES-12XR3 Front Doors

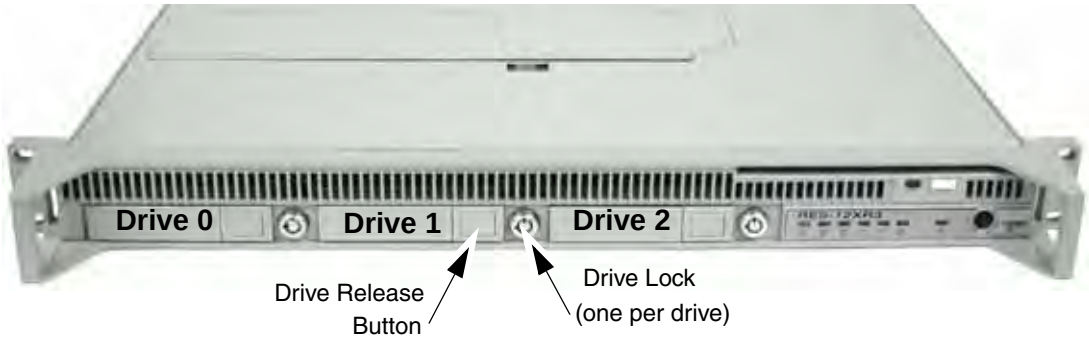


Figure 2-13. Unlocking the RES-12XR3 Storage Drives (Front Doors Removed)

2.1.5.2 Storage-Drive Removal

After opening the front doors, perform the following steps to remove and install a storage drive:

Note: Since RES-12XR3 storage drives are "hot-swappable", it is not necessary to turn off system power in order to remove and replace a drive (except the operating system drive). However, after a warning has been broadcast to all users, the drive being replaced should be dismounted before being removed.

Consult your operating system manual for specific details.

1. Make sure the necessary precautions have been observed as per the previous *Note* (see “Operation” on page 2-20).
2. Locate the drive to be removed.
3. Insert the barrel lock key into the hard drive you want to remove, and turn it 45 degrees clockwise (presuming the storage drive is locked).
4. Firmly push in the latch lock until the latch handle releases from the drive.
5. Grab the latch handle and pull the drive completely away from its slot.

Caution: When pulling the storage drive from the chassis, hold it at the bottom to prevent it from falling and damaging the drive.

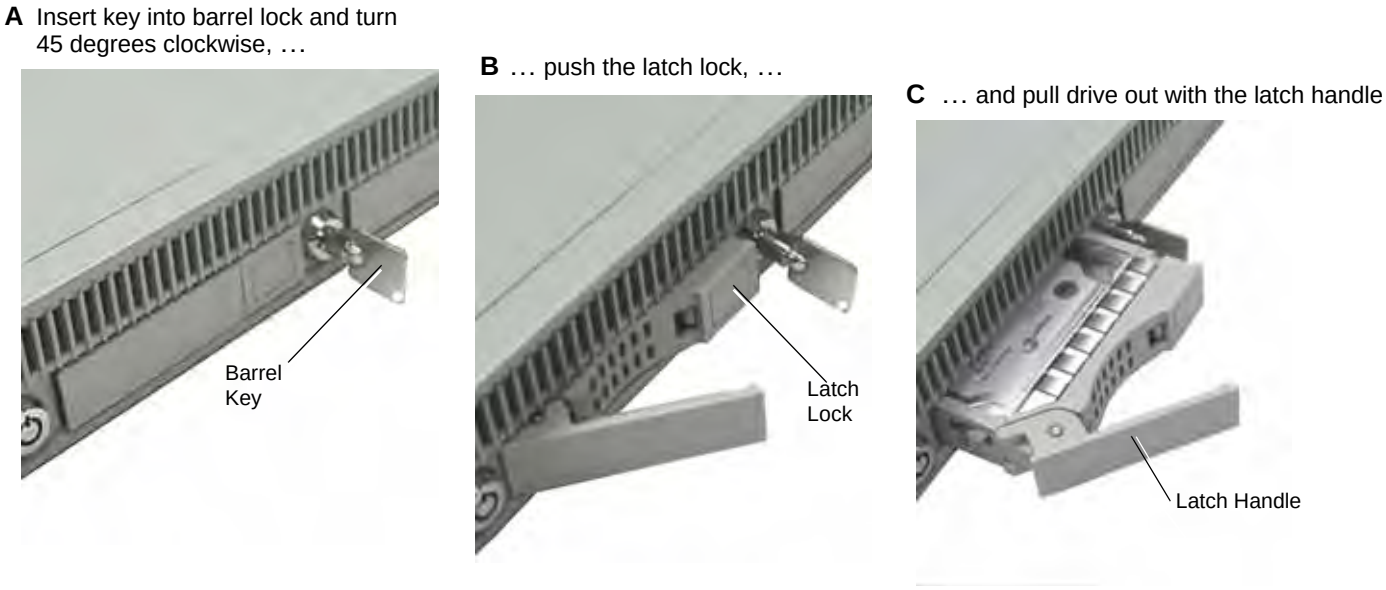


Figure 2-14. RES-12XR3 Storage Drive Removal

2.1.5.3 Storage Drive Installation

To install a storage drive,

1. Make sure the latch handle of the drive to be installed is in the open position.
2. Properly orient the new drive and insert it into the vacant drive slot. If the drive cannot be inserted into the slot, rotate it 180 degrees.

3. Push the drive toward the rear (DO NOT CLOSE the latch handle while pushing) until the drive is flush with the front of the chassis. The handle will swing closed when it comes into contact with the RES-12XR3 chassis.

4. When the drive is fully inserted in its slot, insert the key into the barrel lock and turn it 45 degrees counter-clockwise. The drive is now locked.

Caution: When in the closed position, the latch handle secures the drive to the chassis. If the handle is closed before the drive is fully inserted, the latch mechanism may not fully engage to secure the drive.

5. If you are installing another storage drive, repeat Steps 1–4 for each additional drive.

2.1.6 Hot-Swappable 38-mm Fan

The RES-12XR3 contains five high-speed 38-mm fans, each of which can be "hot-swapped" in the field in the event of a fan failure.

2.1.6.1 Removing and Installing a 38-mm Fan

Perform the following steps to remove and install a 38-mm fan:

Note: Since RES-12XR3 fans are "hot-swappable", it is not necessary to turn off system power in order to remove and replace a fan,

1. Push the fan lid lock left to unlock the fan lid (see *Figure 2-15* on page 2-16). Pull the fan lid upward exposing the five 38-mm fans.

2. Each fan is secured by a fan lock located on top of the fan. To remove a fan, push the fan lock toward the front of the fan and pull the fan directly upward (see *Figure 2-16* on page 2-16).

3. When the fan is removed, its 3-wire connector will automatically be disconnected from the chassis. Insert the replacement fan carefully into the empty fan slot until it is flush with the other fans. The 3-wire connector will automatically engage its counterpart successfully.

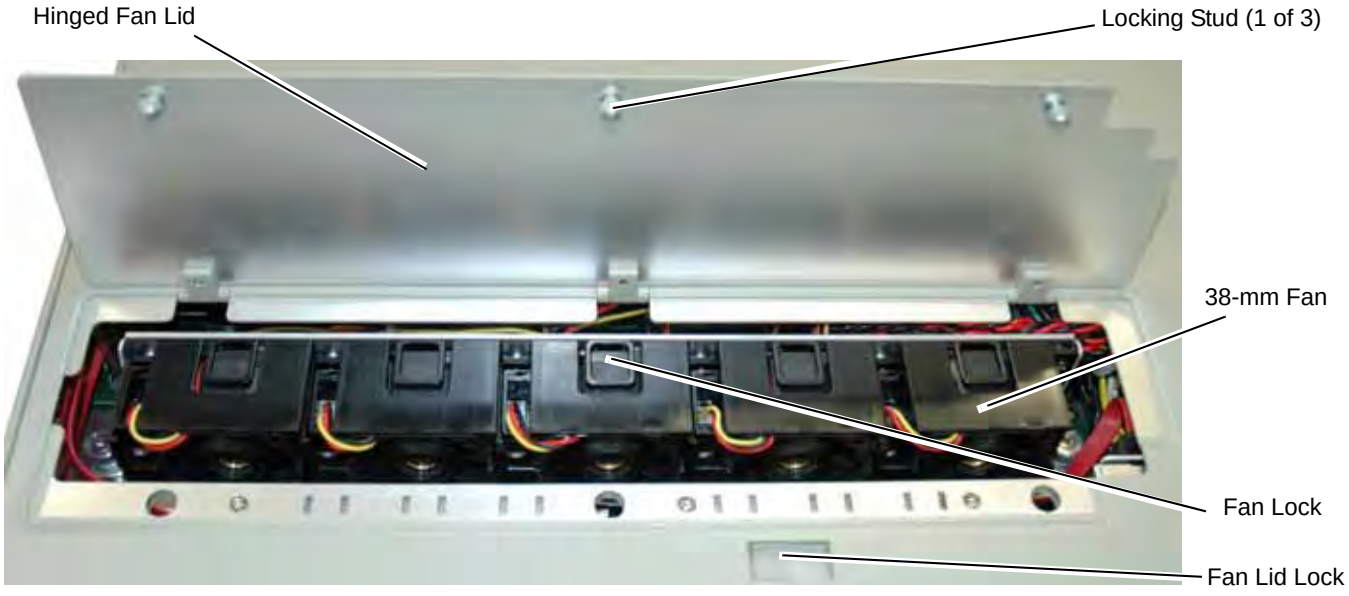


Figure 2-15. The RES-12XR3 Hot-Swappable 38-mm Fans

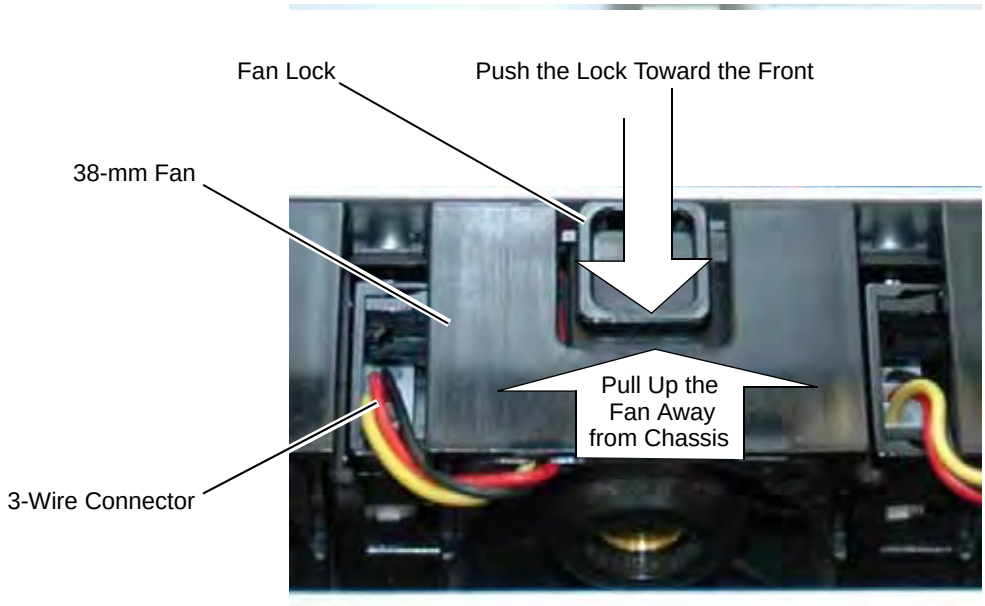


Figure 2-16. Removing One of the Five RES-12XR3 38-mm Fans

2.1.7 Power Supply

Each load-sharing (N+1 redundant) power supply can be hot-swapped while the system is still on and operational.

2.1.7.1 Removing a Power Supply

Perform the following steps to remove a power supply:

1. Loosen the two screws holding the power supply locking bracket to the chassis (see **A**, *Figure 2-17*). Place the bracket in a safe place for further use.
2. Put the right index finger on the power supply extraction handle and the right thumb on the left side of thepower supply locking lever (see **B**, *Figure 2-17*).

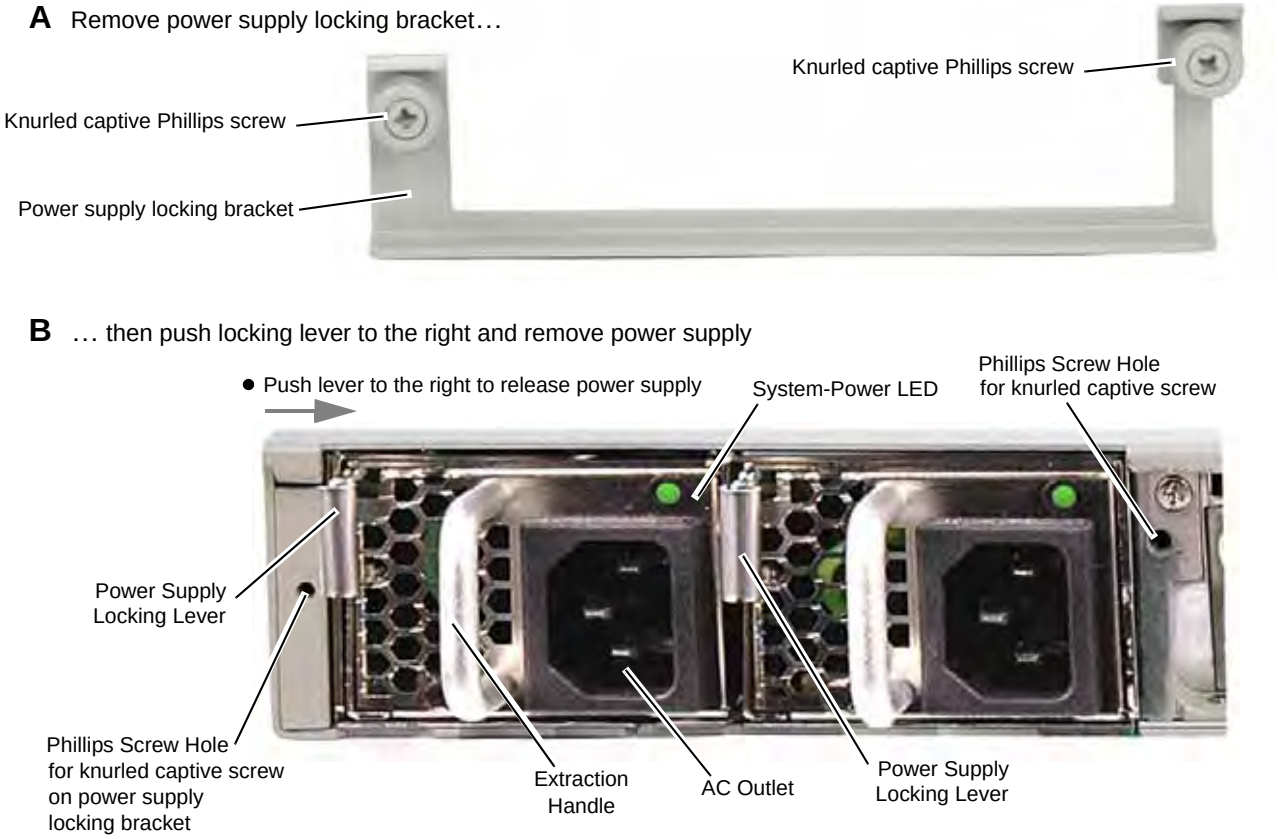


Figure 2-17. The RES-12XR3 Power Supply Locking Mechanism

3. Squeeze the locking lever toward the extraction handle and firmly pull the power supply from the chassis.

Caution: When pulling the power supply from the chassis, hold it at the bottom to prevent it from falling and damaging the unit.

2.1.7.2 Installing a Power Supply

Perform the following steps to install a power supply:

1. Insert the replacement power supply into an empty slot with the power LED at the top (see *Figure 2-17* on page 2-17).
2. Push the power supply carefully into its slot until it is firmly seated (a click will be heard when the locking lever is securely fastened to the chassis).
3. Replace and tighten the two captive screws to hold the power supply locking lever to the chassis (see *Figure 2-17*) to secure both power supplies.

2.2 Rack Mounts

2.2.1 Mounting Brackets

The rack-mount brackets (flanges) are used to secure the chassis to the 19” rack (see *Figure 2-18*). Handles are used to pull the RE S-12XR3 from the rack when rack-mount slides have been installed on the sides of the chassis (see following section).

Figure 2-18. Right Rack-Mount Bracket

2.2.2 Rack-Mount Slides (Optional)

Rack-Mount Slides can be mounted on each side of the RES-12XR3, for the purpose of sliding the unit in and out of a rack. Mounting slides are optional and should be ordered at the time your system is purchased.

To learn how to install rack-mount slides, refer to Appendix B, “Rack-Mount Slide Installation”.

Caution: Any screws used to mount a slide to a RES-12XR3 chassis must not exceed a length of 6mm to prevent excessive penetration of the chassis.

2.3 Operation

2.3.1 Plugging in the AC Power Cords

Before powering on the RES-12XR3, plug in the AC power cords as follows:

1. On the rear of the RES-12XR3, plug an AC power cord (shipped with unit) into the AC power socket on each power supply (see *Figure 2-19*).

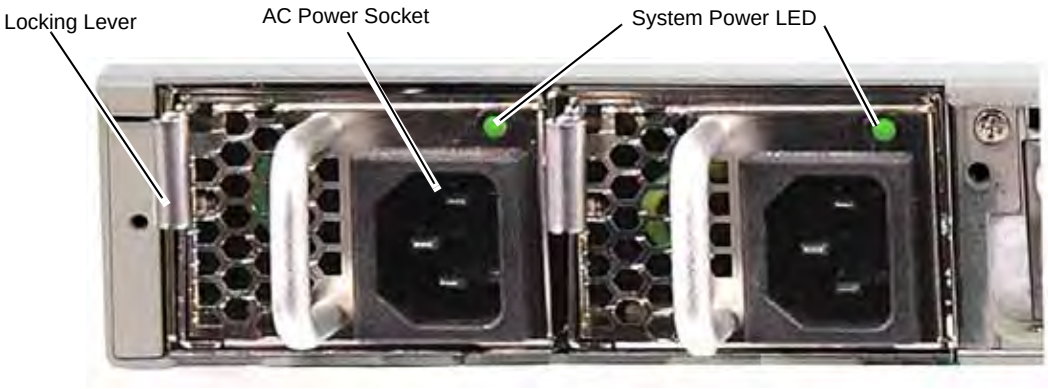


Figure 2-19. AC Power Socket and LED on the RES-12XR3 Rear

2.3.2 Turning the System On

1. Plug the AC power cord from each of the RES-12XR3 power supplies into a "live" AC outlet.
2. On the front of the RES-12XR3 pushthe system power on/off button (see *Figure 2-20*). This will cause the system `POWER` LED to light (green) as well as the rear power supply module LED to light (green).

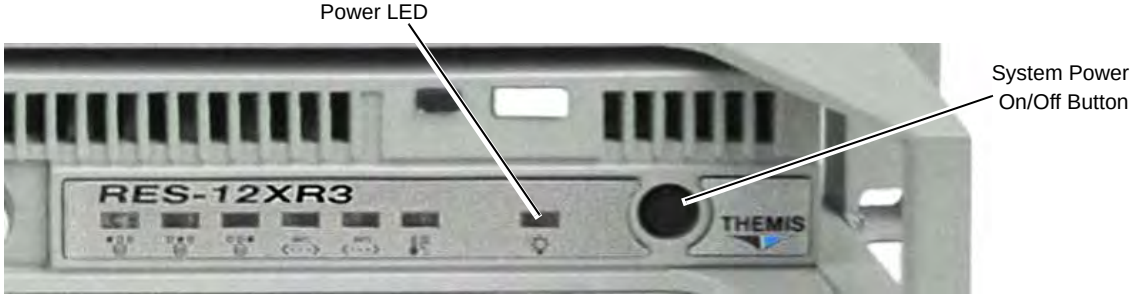


Figure 2-20. System Power Button and LED on the RES-12XR3 Front

2.3.3 Getting Started

2.3.3.1 Configuration

1. Make sure all SATA II drives are installed (see "SATA II Storage Drive" on page 2-12). Drive ID numbers are shown in *Figure 2-14* on page 2-14, Chapter 2. Changes may be made through the BIOS.
2. Make sure that a graphics card is installed in a PCI slot and connect a multiscan monitor to the SVGA or DVI connector.
3. Attach a PS/2 keyboard and mouse to the appropriate connectors on the rear I/O panel of the RES-12XR3 (see *Figure 1-5* on page 1-9)
4. Turn the system on (see previous section).

2.3.3.2 Linux Installation

The subject of installing the Linux operating system onto the RES-12XR3 is detailed in Appendix C, "Red Hat Enterprise Linux 5 Installation".

2.3.4 Turning the System Off

Caution: Before turning your system off, make sure to save all open files, properly close applications, and broadcast a warning to all users on any active networks.

1. To turn the RES-12XR3 power off, press and hold the system power on/off button (see *Figure 2-20*, page 2-20) for at least four (4) seconds. This will shut down the system and turn off the `POWER` LED.

   As an alternative, a modern operating system (Windows 9x or newer and Linux, for example) can turn off the system after a graceful OS software shutdown.

Installation Section

Chapter 3

BIOS Setup Utility

3.1 Introduction

Note: The information on this chapter is based on the Super Micro Computer, Inc., User Manuals for the specific motherboard installed in the system.

This chapter describes the AMI BIOS Setup Utility for the X8DTU-F motherboard. The AMI ROM BIOS is stored in a Flash EEPROM and can be easily updated. This chapter explains the basic navigation of the AMI BIOS Setup Utility setup screens.

3.1.1 Starting BIOS Setup Utility

To view the AMI BIOS Setup Utility screens, press the <Delete> key while the system is booting up.

Note: In most cases, the <Delete> key is employed to view the AMI BIOS setup screen. There are a couple of cases when other keys are used, including <F 1>, <F2>, etc.

Each main BIOS menu option is explained in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

Note: The AMI BIOS has default text messages built in. Themis has the option to include, omit, or alter any of these text messages.

The AMI BIOS Setup Utility employs a key-based navigation system called "hot keys". Most of the AMI BIOS setup utility "hot keys" can be employed at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, arrow keys, etc.

Note: Options printed in **Bold** are default settings.

3.1.2 How To Change the Configuration Data

The configuration data that determines the system parameters may be altered by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing <Del> at the appropriate time during system boot.

3.1.3 Starting the Setup Utility

Normally, the only visible Power-On Self-Test (POST) routine is the memory test. While the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS Setup Utility. From the main menu, you can access the other setup screens. An AMI BIOS identification string is displayed at the left bottom corner of the screen below the copyright message.

Caution: Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreversible damage to the system. In no event shall Themis be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid potential boot failure.

3.2 Main BIOS Setup

When you first enter the AMI BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS Setup screen is shown in *Figure 3-1*.

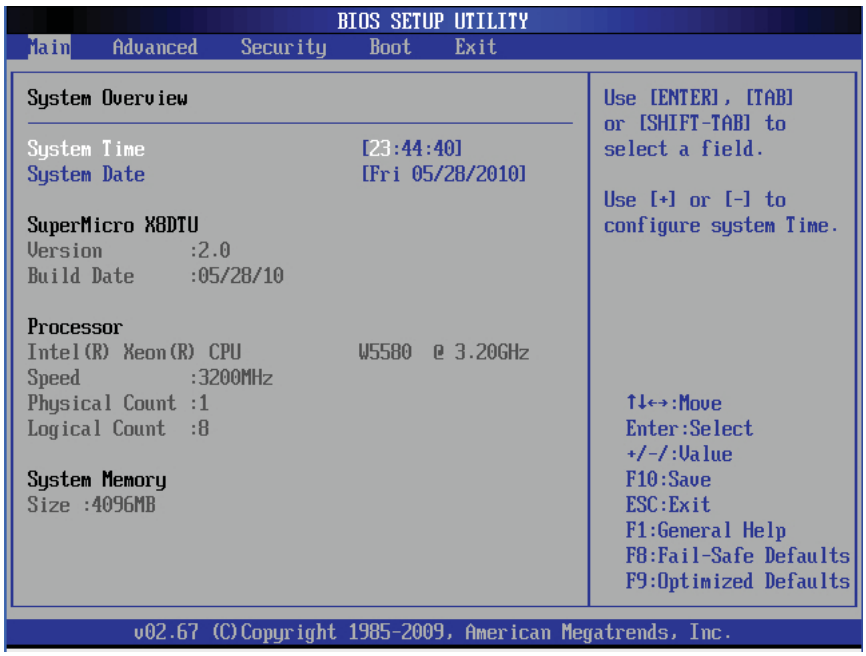


Figure 3-1. Main BIOS Setup Screen

3.2.1 System Overview

The following BIOS information will be displayed:

3.2.1.1 System Time/System Date

Employ this option to alter the system time and date. Highlight *System Time* or *System Date* using the arrow keys. Key in new values through the keyboard and press <Enter>. Press the <Tab> key to move between fields. The date has be entered in Day MM/DD/YY format. The time is entered in HH:MM:SS format.

Note: The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00.

3.2.1.2 AMI BIOS

- **Version**: This item displays the BIOS revision employed in your system.
- **Build Date**: This item displays the date when this BIOS was finished.

3.2.1.3 Processor

The AMI BIOS will automatically display the status of the processor employed in your system:

- **CPU Type**: This item displays the type of CPU used in the motherboard.
- **Speed**: This item displays the speed of the CPU detected by the BIOS.
- **Physical Count**: This item displays the number of processors installed in your system as detected by the BIOS.
- **Logical Count**: This item displays the number of CPU Cores installed in your system as detected by the BIOS.

3.2.1.4 System Memory

This displays the memory size available in the system.

3.3 Advanced Setup Configurations

Use the arrow keys to select Advanced Se ttings and hit <Enter> to access the sub-menu items, then select Boot Features:

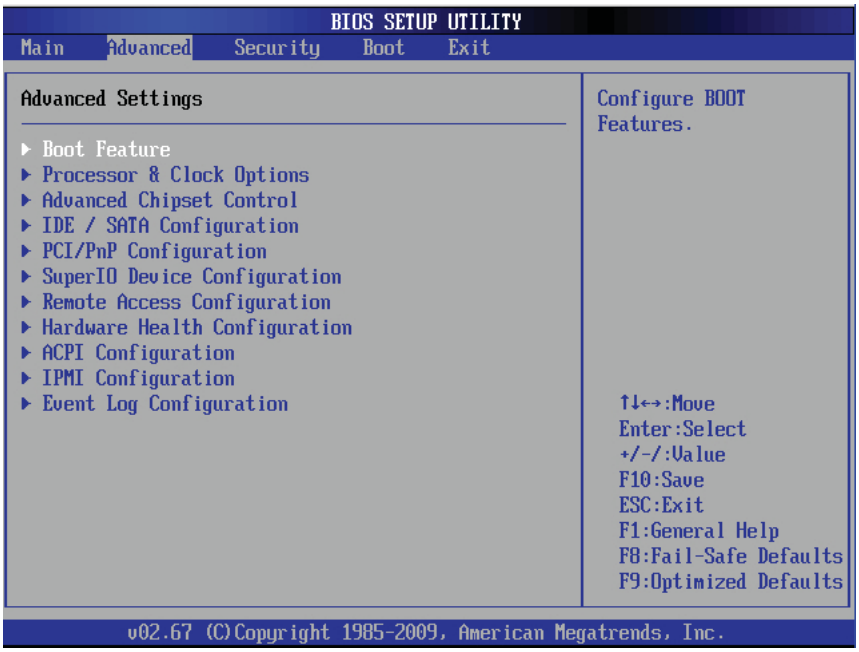


Figure 3-2. Advanced Settings

3.3.1 BOOT Features

3.3.1.1 Quick Boot

If Enabled, this option will skip certai n tests during POST to decrease the time needed for system boot. The options are **Enabled** (default) and Disabled.

3.3.1.2 Quiet Boot

This option allows the bootup screen options to be m odified between POST messages or the OEM logo. Sel ect Disabled to display the POST messages. Select Enabled to display the OEM logo inst ead of the normal PO ST messages. The options are **Enabled** (default) and Disabled.

3.3.1.3 AddOn ROM Display Mode

This sets the display mode for Option ROM. The options are **Force BIOS** (default) and Keep Current.

3.3.1.4 Bootup Num-Lock

This feature selects the Power-on state for Numlock key. The options are Off and **On** (default).

3.3.1.5 Wait For 'F1' If Error

This forces the system to wait until the 'F1' key is pressed if an error occurs. The options are Disabled and **Enabled** (default)

3.3.1.6 Hit 'Del' Message Display

This feature displays "Press DEL to run Setup" during POST. The options are **Enabled** (default) and Disabled.

3.3.1.7 Interrupt 19 Capture

Interrupt 19 is the software interrupt that controls the boot drive function. When this item is set to Enabled, the ROM BIOS of the host adaptors will "capture" Interrupt 19 at boot and allow the drives that are attached to these host adaptors to function as bootable drives. If this item is set to Disabled, the ROM BIOS of the host adaptors will not capture Interrupt 19, and the drives attached to these adaptors will not function as bootable devices. The options are **Enabled** (default) and Disabled.

3.3.2 Power Configuration

3.3.2.1 Watch Dog Function

If enabled, the Watch Dog Timer will allow the system to reboot when it is inactive for more than 5 minutes. The options are Enabled and **Disabled** (default).

3.3.2.2 Power Button Function

If set to Instant_Off, the system will power off immediately upon pressing the power button. If set to 4_Second_Override, the system will power off when the user presses the power button for 4 seconds or longer. The options are **Instant_Off** (default) and 4_Second_override.

3.3.2.3 Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Power-Off for the system power to remain off after a power loss. Select Power-On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last state before a power loss. The options are Power-On, Power-Off and **Last State** (default).

3.3.3 Processor and Clock Options

This submenu allows the user to configure the Processor and Clock settings.

3.3.3.1 Clock Spread Spectrum

Select Enable to use the feature of Clock Spectrum, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic interference caused by the components whenever needed. The options are **Disabled** (default) and Enabled.

3.3.3.2 Hardware Prefetcher (Available when supported by the CPU)

If set to Enabled, the hardware prefetcher will prefetch streams of data and instructions from the main memory to the L2 cache in the forward or backward manner to improve CPU performance. The options are Disabled and **Enabled** (default).

3.3.3.3 Adjacent Cache Line Prefetch (Available when supported by the CPU)

The CPU fetches the cache line for 64 bytes if this option is set to Disabled. The CPU fetches both cache lines for 128 bytes as comprised if **Enabled** (default).

3.3.3.4 L1 Data Prefetch (Available when supported by the CPU)

Select Enabled to enable Level 1 data prefetch support to enhance system performance for UP platforms. For DP/MP servers, use this feature to enhance system performance based on the specification of the application running in the system at the time. the options are Disabled and **Enabled** (default).

3.3.3.5 Data Reuse Optimization (Available when supported by the CPU)

For UP Platforms, select Enabled to maximize data reuse support to enhance system performance. For DP/MP servers, enable or disable this feature based on application specifications. the options are **Enabled** (default) and Disabled.

3.3.3.6 MPS and ACPI MADT Ordering

This feature allows the user to configure the MPS (multiprocessor Specification) and ACPI settings for your motherboard. Select Modern Ordering if Windows XP or a newer version of Windows OS is used in the motherboard. Select Legacy Ordering if 2000 or an earlier version of Windows OS is used. The options are **Modern Ordering** (default) and Legacy Ordering.

3.3.3.7 Intel Virtualization Technology (Available when supported by the CPU)

Select Enabled to employ the feature of Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, producing multiple "virtual" systems in one physical computer. The options are **Enabled** (default) and Disabled.

Note: If there is any change to this setting, you must power off and restart the system for the change to take effect. Please refer to Intel's web site for detailed information.

3.3.3.8 Execute-Disable Bit Capability (Available when supported by the CPU)

Set to Enabled to enable the Execute Disable Bit which will allow the processor to delegate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal codes to overwhelm the processor or damage the system during an attack. The default is **Enabled** (default). (Refer to Intel and Microsoft Web Sites for more information.)

3.3.3.9 Intel AES-NI

Select Enable to use the Intel Advanced Encryption Standard (AES) New Instructions (NI) to ensure data security. The options are **Disabled** (default) and Enabled

3.3.3.10 Simultaneous Multi-Threading (Available when supported by the CPU)

Set to Enabled to employ the Simultaneous Multi-Threading Technology, which will result in enhanced CPU performance. The options are Disabled and **Enabled** (default).

3.3.3.11 Active Processor Cores

Set to Enabled to employ a processor's Second Core and beyond. (Please refer to Intel's web site for more information.) The options are **All** (default)**,** 1 and 2.

3.3.3.12 Intel EIST Technology

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. **Please refer to Intel's web site for detailed information.** The options are Disable (Disable GV3) and **Enable (Enable GV3)** (default).

3.3.3.13 Intel® TurboMode Technology

Select Enabled to use the Turbo Mode to boost system performance. The options are **Enabled** and Disabled.

3.3.3.14 C1E Support

Select Enabled to use the feature of Enhanced Halt State. C1E significantly reduces the CPU's power consumption by reducing the CPU's clock cycle and voltage during a "Halt State." The options are Disabled and **Enabled**.

3.3.3.15 Intel® C-STATE Tech

If enabled, C-State is set by the system automatically to either C2, C3, or C4 state. The options are Disabled and **Enabled** (default).

3.3.3.16 C-State package limit setting

If set to Auto, the AMI BIOS will automatically set the limit on the C-State package register. The options are **Auto** (default), C1, C3, C6, and C7.

3.3.3.17 C1 Auto Demotion

When enabled, the CPU will conditionally demote C3, C6 or C7 requests to C1 based on un-core auto-demote information. The options are Disabled and **Enabled.**

3.3.3.18 C3 Auto Demotion

When enabled, the CPU will conditionally demote C6 or C7 requests to C3 based on un-core auto-demote information. The options are Disabled and **Enabled.**

3.3.3.19 ACPI T State

Select Enabled to report processor throttling in the ACPI. The options are **Disabled** (default) and Enabled.

3.3.4 Advanced Chipset Control

The items included in the Advanced Settings submenu are listed below:

3.3.4.1 CPU Bridge Configuration

- CPU Revision: This item displays the CPU revision number.
- Current QPI Frequency: This item displays the current CPU memory frequency.
- Memory Reference Code: This item displays the memory reference code.
- QPI Reference Code: This item displays the QPI reference code for the motherboard.

3.3.4.2 Request Transaction ID (Available for the Intel Xeon 5600 platform only)

QuickPath Interconnect (QPI) is the connection between the CPUs and the I/O hub (IOH). For a transaction to be processed in the QPI, a "Transaction ID" is required, and it is assigned by an agent (CPU1, CPU2, or the IOH). Each agent is allocated a number of Transaction IDs based on the QPI IO Bandwidth and the Request Transaction ID (RTID) setting (32-24-32 or 32-16-40). Once Transaction IDs are allocated to an agent, it will assign a Transaction ID to an event so that it can be processed in the QPI. Select Balanced to allocate transactions IDs to an agent based on the setting 32-24-32. Select IO Bias to allocate RTIDs based on the setting 32-16-40. The options are **Balanced** (default) and IO Bias

3.3.4.3 QPI Links Speed

This feature selects QPI's data transfer speed. the option are Slow-mode, and **Full Speed** (default).

3.3.4.4 QPI Frequency

This selects the desired QPI frequency. The options are **Auto** (default), 4.800 GT, 5.866GT, 6.400 GT.

3.3.4.5 QPI L0s and L1

This enables the QPI power state to low power. L0s and L1 are automatically selected by the motherboards. The options are **Disabled** (default) and Enabled.

3.3.4.6 Memory Frequency

This feature forces a DDR3 frequency slower than what the system has detected. The available options are **Auto** (default), Force DDR-800, Force DDR-1066, and Force DDR-1333.

3.3.4.7 Memory Mode

The options are **Independent** (default), Channel Mirror, Lockstep, and Sparing.

Independent—All DIMMs are available to the operating system.

Channel Mirror—The motherboard maintains two identical copies of all data in memory for redundancy.

Lockstep—The motherboard uses two areas of memory to run the same set of operations in parallel.

Sparing—A preset threshold of correctable errors is used to trigger fail-over. The spare memory is put online and used as active memory in place of the failed memory.

3.3.4.8 Demand Scrubbing

A memory error-correction scheme where the Processor writes corrected data back into the memory block from where it was read by the Processor. The options are Enabled and **Disabled** (default).

3.3.4.9 Patrol Scrubbing

A memory error-correction scheme that works in the background looking for and correcting resident errors. The options are **Enabled** (default) and Disabled.

3.3.4.10 Throttling - Closed Loop/Throttling - Open Loop

Throttling improves reliability and reduces power in the processor by automatic voltage control during processor idle states. Available options are Disabled and **Enabled** (default).

NorthBridge Configuration

3.3.4.11 Intel I/OAT

The Intel I/OAT (I/O Acceleration Technology) significantly reduces CPU overhead by leveraging CPU architectural improvements, freeing resources for other tasks. The options are Disabled and **Enabled** (default).

3.3.4.12 DCA (Direct Cache Access)Technology

This feature works in conjunction with the Intel I/OAT (Acceleration Technology) to accelerate the performance of the TOE device. When this feature is set to Enabled, it will enhance overall system performance by providing direct cache access for data transferring. The options are **Enabled** (default) and Disabled.

3.3.4.13 DCA Prefetch Delay

A DCA Prefetch is used with TOE components to prefetch data in order to shorten execution cycles and maximize data-processing efficiency. Prefetching frequently can saturate the cache directory and delay necessary cache accesses. This feature reduces or increases the frequency the system prefetches data. The options are [8], [16], **[32]** (default), [40], [48], [56], [64], [72], [80], [88], [96], [104], [112], [120].

3.3.4.14 Intel VT-d

Select Enabled to enable Intel's Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to VMM through the DMAR ACPI Tables. This feature offers fully-protected I/O resource-sharing across the Intel platforms, providing the user with greater reliability, security and availability in networking and data-sharing. The settings are Enabled and **Disabled** (default).

3.3.4.15 Active State Power Management

Select Enabled to use the power management for signal transactions between the PCI Express L0 and L1 Links. Select enabled to configure PCI-Exp. L0 and L1 Link power states. The options are **Disabled** (default) and Enabled.

3.3.4.16 Slot SXB2/SXB3 Width

This feature allows the user to change the link width of a PCI slot as specified in order to support a riser or add-on card installed in the slot. The Options are x4x4, **x8** (default) and auto.

3.3.4.17 Slot SXB1 Width

This feature allows the user to change the link width of a PCI slot as specified in order to support a riser or add-on card installed in the slot. The options are x4x4x4x4, x4x4x8, x8x4x4, **x8x8** (default), x16 and Auto, as seen in the table below.

3.3.4.18 IOH PCI-E Max Payload Size

Some add-on cards perform faster with the coalesce feature, which limits the payload size to 128B; while others, with a payload size of 256B which inhibits the coalesce feature. Please refer to your add-on card user guide for the desired setting. The options are **256B** (default) and 128B

SouthBridge Configuration

3.3.4.19 USB Functions

This feature allows the user to enable or disable on board USB Support. The options are: Disabled, and **Enabled** (default).

3.3.4.20 Legacy USB Support

Select Enabled to use Legacy USB devices. If this item is set to Auto, Legacy USB support will be automatically enabled if a legacy USB device is installed on the motherboard, and vise versa. The settings are Disabled, and **Enabled** (default).

3.3.4.21 Port 60h/64h Emulation

Select Enabled to enable 60h/64h emulation for complete USB keyboard support for operating systems that are not compatible with USB devices. The options are Enabled and **Disabled** (default).

3.3.4.22 USB 2.0 Controller (Available when *USB Functions* is Disabled)

This feature displays the current USB controller used in the motherboard.

3.3.4.23 USB 2.0 Controller Mode

This setting allows you to select the USB 2.0 Controller mode. The options are **Hi-Speed (480 Mbps)** (default) and Full Speed (12 Mbps).

3.3.4.24 BIOS EHCI Hand-Off

Select Enabled to enable BIOS Enhanced Host Controller Interface support to provide a workaround solution for an operating system that does not have EHCI Hand-Off support. When enabled, the EHCI Interface will be changed from the BIOS-controlled to the OS-controlled. The options are Disabled and **Enabled** (default).

3.3.4.25 Route Port 80h Cycle to

Use this item to decide where to route Port 80h Cycle to. The Options are **LPC** (default) and PCI.

3.3.5 IDE/SATA/Floppy Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the IDE, SATA, and floppy devices and displays the following items:

3.3.5.1 SATA#1 Configuration

If Compatible is selected, it sets SATA#1 to legacy compatibility mode, while selecting Enhanced sets SATA#1 to native SATA mode. The options are Disabled, Compatible and **Enhanced** (default).

Configure SATA#1 as

This feature allows the user to select the drive type for SATA#1. The options are **IDE,** RAID and AHCI. (When the option-RAID is selected, the item-ICH RAID Code Base will appear. When the option-AHCI is selected, the item-SATA AHCI will be available).

ICH RAID Code Base (Available when the option-RAID is selected)

Select Intel to enable Intel's SATA RAID firmware to configure Intel's SATA RAID settings. Select Adaptec to enable Adaptec's SATA RAID firmware to configure Adaptec's SATA RAID settings. The options are **Intel** (default) and Adaptec.

SATA AHCI (Available when the option-AHCI is selected)

Select Enable to enable the function of Serial ATA Advanced Host Interface.

Caution: Take caution when using this function. This feature is for advanced programmers only.

SATA#2 Configuration (Available when the option-IDE is selected.)

Selecting Enhanced will set SA TA#2 to native SATA mode. The options are Disabled, and **Enhanced** (default).

3.3.5.2 IDE Detect Timeout (sec)

Use this feature to set the time-out valu e for the BIOS to detect the ATA, ATAPI devices installed in the system. The options are 0 (sec), 5, 10, 15, 20, 25, 30, and **35** (default).

3.3.5.3 Primary IDE Master/Slave, Secondary IDE Master/Slave, Third IDE Master, and Fourth IDE Master

These settings allow the user to set the parameters of the Primary IDE Master/Slave, Secondary IDE Master/Slave, Third and Fourth IDE Master slots. Press <enter> to activate the following submenu screen for detailed options of th ese items. Set the correct configurations accordingly. The items included in the submenu are:

Type

Use this item to select the type of device connected to the system. The options are Not Installed, **Auto** (default), CD/DVD and ARMD

LBA/Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a storage drive. In the LBA mode, the maximum dive capacity is 137 GB. For drive capacities over 137 GB, your system must be equipped with a 48-bit LBA mode addressing support. If not, install a A TA/133 IDE controller card that supports 48-bit LBA mode. The options are disabled and **Auto** (default)

Block (Multi-Sector Transfer)

Block Mode boosts the IDE drive perfor mance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if Block Mode is not used. Block Mode allows transfers of up to 64 KB per interrupt. Select Disabled to allow data to be transferred from and to the device on e sector at a time. Select Auto to allow data transfer from and to the device occur multiple sectors at a time if the device supports it. The options are **Auto** (default) and Disabled.

PIO Mode

The IDE PIO (Programmable I/O) Mode programs timing cycles between the IDE drive and the programmable ID E controller. As the PIO mode increases, the cycle time decreases. The options are **Auto** (default), 0, 1, 2, 3, and 4.

Select **Auto** (default) to allow the AMI BIOS to automatically detect the PIO mode. Use this value if the IDE storage drive support cannot be determined.

Select 0—4 to allow the AMI BIOS to use PIO mode 0—4. It has a data transfer rate of 3.3 MB/s—16.6MB/s. See *Table 3-1* below for PIO Mode Select options.

Table 3-1. PIO Mode Select Options

Option Selected	PIO Mode	Max. Transfer Rate
0	PIO Mode 0	3.3 MB/s
1	PIO Mode 1	5.2 MB/s
2	PIO Mode 2	8.3 MB/s
3	PIO Mode 3	11.1 MB/s
4	PIO Mode 4	16.6 MB/s

DMA Mode

Select Auto to allow the BIOS to automatically detect IDE DMA mode when the IDE storage device support cannot be determined. The options are Auto (default), SWDMAn, MWDMAn, and UDMAn. See *Table 3-2* below for DMA Mode Select Options.

Table 3-2. DMA Mode Select Options

Option Selected	DMA Mode	Max. Transfer Rate
SWDMA 0	Single-Word DMA 0	2.1 MB/s
SWDMA 1	Single-Word DMA 1	4.2 MB/s
SWDMA 2	Single-Word DMA 2	8.3 MB/s
MWDMA 0	Multi-Word DMA 0	4.2 MB/s
MWDMA 1	Multi-Word DMA 1	13.3 MB/s
MWDMA 2	Multi-Word DMA 2	16.6 MB/s

Table 3-2. DMA Mode Select Options (Continued)

Option Selected	DMA Mode	Max. Transfer Rate
UDMA 0	Ultra DMA 0	16.6 MB/s
UDMA 1	Ultra DMA 1	25 MB/s
UDMA 2	Ultra DMA 2	33.3 MB/s
UDMA 3	Ultra DMA 3	44.4 MB/s
UDMA 4	Ultra DMA 4	66.6 MB/s
UDMA 5	Ultra DMA 5	100 MB/s
UDMA 6	Ultra DMA 6	133 MB/s

S.M.A.R.T. For Storage Drives

Self-Monitoring Analysis and Reporting Technology (SMART) can help predict impending drive failures. Select Auto to allow the AMI BIOS to automa tically detect storage drive support. Select Disabled to preven t the AMI BIOS from using S.M.A.R.T. Select Enabled to allow the AMI BIOS to use S.M.A.R.T. to support the storage drives. The options are Disabled, Enabled, and **Auto** (default).

32Bit Data Transfer

Select Enable to enable the function of 32-bit IDE data transfer . The options are **Enabled** (default) and Disabled.

3.3.6 PCI/PnP Configuration

3.3.6.1 Clear NVRAM

This feature clears the NVRAM dur ing system boot. The options are **No** (default) and Yes.

3.3.6.2 Plug & Play OS

Selecting Yes allows the OS to configure Plug & Play devi ces. (This is not required for system boot if your syst em has an OS that suppor ts Plug & Play .) Select **No** (default) to allow the AMI BIOS to configure all devices in the system.

3.3.6.3 PCI Latency Timer

This feature sets the latency Timer of each PCI device installed on a PCI bus. Select 64 to set the PCI latency to 64 PCI clock cycles. The options are 32, **64** (default), 96, 128, 160, 192, 224, and 248.

3.3.6.4 PCI IDE BusMaster

When enabled, the BIOS uses PCI bus mastering for reading/writing to IDE drives. The options are Disabled and **Enabled** (default)**.**

3.3.6.5 SR-1OV Supported

Select Enabled to enable Single Root I/O Virtualization (SR-1OV) support which works in conjunction with the Intel V irtualization Technology and allow multiple operating systems running simultaneously within a single computer via natively share PCI-Express devices in order to enhance network connectivity and perfor - mance. The options are Enabled and **Disabled** (default).

3.3.6.6 PCI-E Slot from SXB1/PCI-E Slot from SXB2/PCI-E Slot from SXB3

Select Enabled to enable PCI-E SXB1 slot, PCI-E SXB2 slot or PCI-E SXB3 slot. It can also enable Option ROMs to boot computer using a network interface from these slots. (SXB1, a x16 slot, can be configured into two x8 slots. SXB2, a x8 slot, can be configured into two x4 slots.) The options are **Enabled** (default) and Disabled.

3.3.6.7 Onboard LAN Option ROM Select

Select iSCSI to use iSCS I Option ROMs to boot the co mputing using a network device. Select iSCSI to use PXE Option ROMs to boot the computing using a net- work device. The options are iSCSI and **PXE** (default).

3.3.6.8 Load Onboard LAN1 Option ROM/Load Onboard LAN2 Option ROM

Select Enabled to enable the onboard LAN1 or LAN2 Option ROM. This is to boot the computer using a ne twork interface. The opt ions are Enabled and **Disabled** (default).

3.3.6.9 Boots Graphics Adapter Priority

This feature allows the user to select the priority gra phics adapter for system boot. The options are **Onboard VGA** (default) and offboard VGA.

3.3.7 Super IO Device Configuration

3.3.7.1 Serial Port1 Address/ Serial Port2 Address

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 1 and Serial Port 2. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port physically becomes unavailable. Select 3F8/IRQ4 to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. The options for Serial Port1 are Disabled, **3F8/IRQ4** (default) 3E8/IRQ4, 2E8/IRQ3. The options for Serial Port2 are Disabled, **2F8/IRQ3** (default), 3E8/IRQ4, and 2E8/IRQ3.

3.3.7.2 Serial Port 2 Attribute

This feature allows the user to set COM2 as a normal serial port, or a virtual COM port used for SOL (Serial Over LAN). The options are **SOL** (default), and COM

3.3.8 Remote Access Configuration

3.3.8.1 Remote Access

This allows the user to enable the Remote Access feature. The options are **Enabled** (default) and Disabled. If Remote Access is set to **Enabled** (default), the following items will be displayed:

Serial Port Number

This feature allows the user to decide which serial port to be used for Console Redirection. The options are COM 1 and **COM 2** (default).

Serial Port Mode

This feature allows the user to set the serial port mode for Console Redirection. The options are **115200 8, n 1** (default); 57600 8, n, 1; 38400 8, n, 1; 19200 8, n, 1; and 9600 8, n, 1.

Flow Control

This feature allows the user to set the flow control for Console Redirection. The options are **None** (default), Hardware, and Software.

Redirection After BIOS POST

Select Disabled to turn of f Console Redirection after Power-On Self-Test (POST). Select Always to keep Console Redirection active all the time after POST.

Note: This setting may not be supported by some operating systems.

Select Boot Loader to keep Console Redirection active during POST and Boot Loader. The options are Disabled, Boot Loader, and **Always** (default).

Terminal Type

This feature allows the user to select the target terminal type for Cons ole Redirection. The options are ANSI, **VT100** (default), and VT-UTF8.

VT-UTF8 Combo Key Support

A terminal keyboard definition that provides a way to send commands from a remote console. Available options are **Enabled** (default) and Disabled.

Sredir Memory Display Delay

This feature defines the lengt h of time in seconds to display memory information. The options are **No Delay** (default)**,** Delay 1 Sec, Delay 2 Sec, and Delay 4 Sec.

3.3.9 Hardware Health Event Monitoring

This feature allows the user to monitor system health and review the status of each item as displayed.

3.3.9.1 CPU Overheat Alarm

This option allows the user to se lect the CPU Overheat Alarm setting which determines when the CPU OH alarm will be activated to provide warning of possible CPU overheat.

Caution: **1.** Any temperature that exceeds the CPU threshold temperature predefined by the CPU manufacturer may result in CPU overheat or system instability. When the CPU temperature reaches this predefined threshold, the CPU and system cooling fans will run at full speed.

2. To avoid possible system overheating, please be sure to provide adequate airflow to your system.

The options are:

- *The Early Alarm*: Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered as soon as the CPU temperature reaches the CPU overheat threshold as predefined by the CPU manufacturer.

- ***The Default Alarm*** (default): Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered when the CPU temperature reaches about 5 ºC above the threshold temperature as predefined by the CPU manufacturer to give the CPU and system fans additional time needed for CPU and system cooling. In both the alarms above, please take immediate action as shown below.

3.3.9.2 CPU 1 Temperature/CPU 2 Temperature/System Temperature

This feature displays current temperature readings for the CPU and the System. The following items will be displayed for your reference only:

CPU1 Temperature/CPU2 Temperature

The CPU thermal technology that reports absolute temperatures (Celsius/Fahrenheit) has been upgraded to a more advanced feature by Intel in its newer processors. The basic concept is each CPU is embedded by unique temperature information that the motherboard can read. This 'Temperature Threshold' or 'Temperature Tolerance' has been assigned at the factory and is the baseline on which the motherboard takes action during different CPU temperature conditions (i.e., by increasing CPU Fan speed, triggering the Overheat Alarm, etc). Since CPUs can have different 'Temperature Tolerances', the installed CPU can now send information to the motherboard what its 'Temperature Tolerance' is, and not the other way around. This results in better CPU thermal management. Supermicro has leveraged this feature by assigning a temperature status to certain thermal conditions in the processor (Low, Medium and High). This makes it easier for the user to understand the CPU's temperature status, rather than by just simply seeing a temperature reading (i.e., 25 ºC). The CPU Temperature feature will display the CPU temperature status as detected by the BIOS:

Low – This level is considered as the 'normal' operating state. The CPU temperature is well below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as configured in the BIOS (Fan Speed Control).

User intervention: No action required.

Medium – The processor is running warmer. This is a 'precautionary' level and generally means that there may be factors contributing to this condition, but the CPU is still within its normal operating state and below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as configured in the BIOS. The fans may adjust to a faster speed depending on the Fan Speed Control settings.

User intervention: No action is required. However, consider checking the CPU fans and the chassis ventilation for blockage.

High – The processor is running hot. This is a 'caution' level since the CPU's 'Temperature Tolerance' has been reached (or has been exceeded) and may activate an overheat alarm.

User intervention: If the system buzzer and Overheat LED has activated, take action immediately by checking the system fans, chassis ventilation and room temperature to correct any problems.

Note: **1.** The system may shut down if it continues for a long period to prevent damage to the CPU.

2. The information provided above is for your reference only. For more information on thermal management, please refer to Intel's Web site at www.Intel.com.

System Temperature:

The system temperature will be displayed (in degrees in Celsius and Fahrenheit) as it is detected by the BIOS.

3.3.9.3 Fan 1—Fan 8 Reading

This feature displays the fan speed readings from fan interfaces Fan 1 through Fan 8.

3.3.9.4 Fan Speed Control Modes

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase for effective system cooling. Select "Full Speed/FS" to allow the onboard fans to run at full speed for

maximum cooling. The FS setting is recommended for special system configuration or debugging. Select "Performance/PF" for better system cooling. The PF setting is recommended for high-power-consuming and high density systems. Select "Balanced/BL" for the onboard fans to run at a speed that will balance the needs between system cooling and power saving. The BL setting is recommended for regular systems with normal hardware configurations. Select "Energy Saving/ES" for best power efficiency and maximum quietness. The Options are: Full Speed/FS, Performance/PF, Balanced/BL, and **Energy Saving/ES** (as set by the configurations in this manual).

3.3.9.5 Voltage Monitoring

CPU1 Vcore, CPU2 Vcore, CPU1 DIMM, CPU2 DIMM, 5V, 5VSB, 12V, -12V, 3.3Vcc, 3.3VSB, VBAT, and Vtt.

3.3.10 ACPI Configuration

Use this feature to configure Advanced Configuration and Power Interface (ACPI) power management settings for your system.

3.3.10.1 High Performance Event Timer

Select Enabled to activate the High Performance Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback, and reducing the dependency on other timestamp calculation devices such as an x86 RDTSC Instruction embedded in the CPU. The HPET is used to replace the 8254 Programmable Interval Timer. Options are **Enabled** (default) and Disabled.

3.3.10.2 ACPI Aware O/S

Select Yes to enable ACPI support for an operating system that supports ACPI. Select No to disable ACPI support for an OS that does not support ACPI. The options are **Yes** (default) and No.

3.3.10.3 ACPI APIC Support

Select Enabled to include the ACPI APIC Table Pointer in the RSDT (Root System Description Table) pointer list. The options are **Enabled** (default) and Disabled.

3.3.10.4 APIC ACPI SCI IRQ

When this item is set to Enabled, APIC ACPI SCI IRQ is supported by the system. The options are Enabled and **Disabled** (default).

3.3.10.5 Headless Mode

This feature is used to enable system to function without a keyboard, monitor, or mouse attached. The options are Enabled and **Disabled** (default).

3.3.10.6 ACPI Version Features

The options are ACPI v1.0, **ACPI v2.0** (default), and ACPI v3.0. Please refer to ACPI's website for further explanation: http://www.acpi.info/.

3.3.10.7 NUMA Support

Select Enabled to use the feature of Non-Uniform Memory Access to improve CPU performance. The options are Disabled, **Enabled** (default) and NUMA for SLES 11 (SUSE Linux Enterprise Server 11)

3.3.10.8 WHEA Support

Select Enabled to enable Windows Hardware Error Architecture (WHEA) support which will provide a common infrastructure for the system to handle hardware errors on Windows platforms in order to reduce system crashes due to hardware errors, and to enhance system recovery and health monitoring. The default setting is **Enabled**.

3.3.11 IPMI Configuration

Intelligent Platform Management Interface (IPMI) is a set of common interfaces that IT administrators can use to monitor system health and to manage the system as a whole. For more information on the IPMI specifications, please visit Intel's website at www.intel.com.

3.3.11.1 IPMI Firmware Version

This item displays the current IPMI Firmware Version.

3.3.11.2 Status of BMC Working

The Baseboard Management Controller (BMC) manages the interface between system management software and platform hardware. This item displays the status of the current BMC controller.

3.3.12 View BMC System Event Log

This feature displays the BMC System Ev ent Log (SEL). It shows the total number of entries of BMC System Events.

To view an event, select an Entry Number and pressing <Enter> to display the information as shown in the screen.

- Total Number of Entries
- SEL Entry Number
- SEL Record ID
- SEL Record Type
- Event Timestamp
- Generator ID
- Event Message Format User
- Event Sensor Type
- Event Sensor Number,
- Event Dir Type
- Event Data.

3.3.12.1 Clear BMC System Event Log

Clear BMC System Log

Select OK and press the <Enter> key to clear the BMC system log. Select Cancel to keep the BMC System log. The options are **OK** (default) and Cancel.

Caution: Any cleared information is unrecoverable. Make absolutely sure that you no longer need any data stored in the log before clearing the BMC Event Log.

3.3.13 Set LAN Configuration

Set this feature to configure the IPMI LAN adapter with a network address as shown in the following graphics.

Channel Number

Enter the channel number for the SET LAN Config command. This is initially set to **[1]** (default). Press "+" or "-" on your keyboard to change the Channel Number.

Channel Number Status

This feature returns the channel status for the Channel Number selected above: "Channel Number is OK" or "Wrong Channel Number".

IP Address Source

This features allows the user to select how an IP address is assigned to a client computer or network device. Select DHCP (Dynamic Host Configuration Protocol) to allow a client (computer or device) obtains an IP address from a DHCP server that manages a pool of IP addresses and network information on a "request and grant" basis. Upon time-out (or lease expiration), the IP address assigned to the client can be reassigned to a new client. Select **Static** (Static Allocation) (default) to allow the host server to allocate an IP address based on a table containing MAC Address/IP Address pairs that are manually entered (probably by a network administrator). Only clients with a MAC address listed in the MAC/IP Address Table will be assigned an IP address. The IP Address allocated to the client is on a longer term basis than that assigned by the DHCP mentioned in the other option. The options are **DHCP** (default) and Static.

IP Address

The BIOS will automatically enter the IP address of this machine; however it may be over-ridden. IP addresses are 6 two-digit hexadecimal numbers (Base 16, 0—9, A, B, C, D, E, F) separated by dots. (i.e., 00.30.48.D0.D4.60).

Subnet Mask

This item displays the current subnet mask setting for your IPMI connection. The value of each three-digit number separated by dots should not exceed 255.

Gateway Address

The BIOS will automatically enter the Gateway address of this machine; however it may be over-ridden. IP addresses are 6 two-digit hexadecimal numbers (Base 16, 0—9, A, B, C, D, E, F) separated by dots. (i.e., 00.30.48.D0.D4.60).

Mac Address

The BIOS will automatically enter the Mac address of this machine; however it may be over-ridden. Mac addresses are 6 two-digit hexadecimal numbers (Base 16, 0—9, A, B, C, D, E, F) separated by dots. (i.e., 00.30.48.D0.D4.60).

3.3.14 Event Log Configuration

3.3.14.1 View Event Log

Use this option to view the System Event Log.

3.3.14.2 Mark All Events as Read

This option marks all events as read. The options are OK and Cancel.

3.3.14.3 Clear Event Log

This option clears the Event Log memory of all messages. The options are OK and **Cancel** (default).

3.3.14.4 PCIE ErrorLog

Use this option to enable PCI-E er ror (PERR) logging. The options are **Yes** and No (default).

3.3.14.5 Memory Error Log

Use this option to enable memo ry error logging. The options are **Yes** (default) and No.

3.4 Security Settings

The AMI BIOS provides a Supervisor a nd a User password. If you use both passwords, the Supervisor password must be set first.

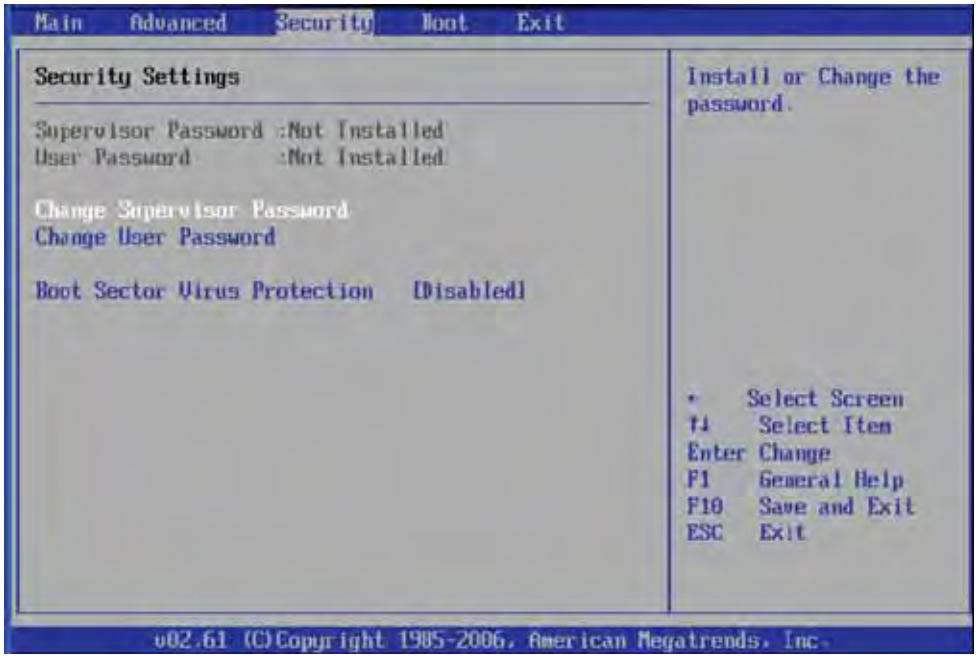


Figure 3-3. Security Settings

3.4.1 Supervisor Password

This item indicates if a Supervisor password has been entered for the system. “Not Installed” means a Supervisor password has not been used.

3.4.2 User Password

This item indicates if a user passwor d has been entered for the system. “Not Installed” means that a user password has not been used.

3.4.3 Change Supervisor Password

Select this feature and press <Enter> to access the submenu, and then type in a new Supervisor Password.

3.4.4 User Access Level (Available when Supervisor Password is set as above)

Select **Full Access** (default) to grant the User full access to the Setup Utility, and change Setup settings. Select View Only to allow the user access to the Setup Utility and view the settings without making changes. Select Limited to allow the user to change selected settings such as Date and Time. Select No Access to prevent the User from accessing the Setup Utility.

3.4.5 Change User Password

Select this feature and press <Enter> to access the submenu, and then type in a new User Password.

3.4.6 Clear User Password (Available only when User Password has been set)

This item allows you to clear a user password after it has been entered.

3.4.7 Password Check

This item allows you to check a password after it has been entered. The options are **Setup** (default) and Always.

3.4.8 Boot Sector Virus Protection

When Enabled, the AMI BIOS displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the storage drive. The options are Enabled and **Disabled** (default).

3.5 Boot Configuration

Use this feature to configure boot settings.

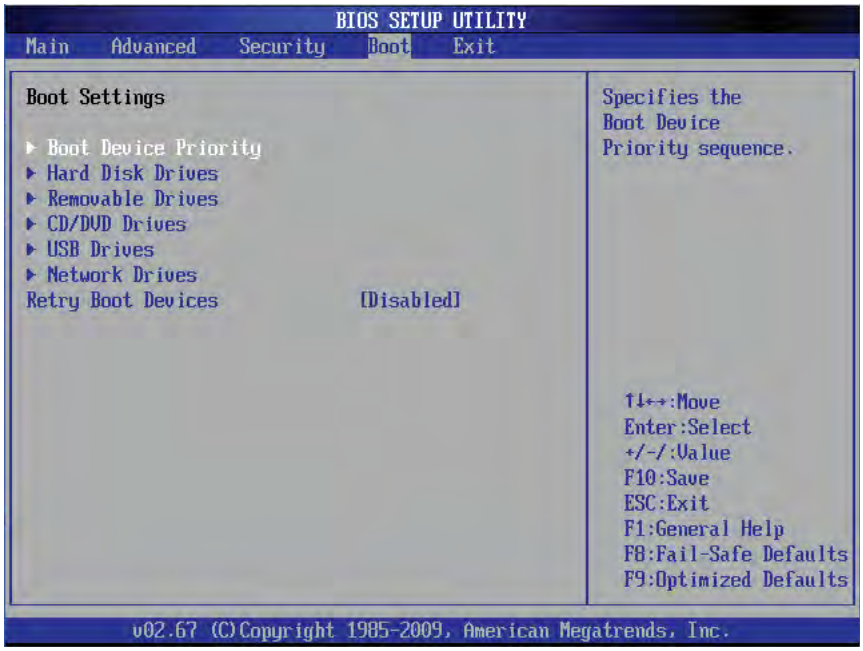


Figure 3-4. Boot Settings

3.5.1 Boot Device Priority

This feature allows the user to specify the priority sequence of boot devices, including the 1st boot device, 2nd boot device, et c. The options are Removable Devices, Storage Drive, CD/DVD, USB, Network, and Disabled.

- 1st Boot Device
- 2nd Boot Device

3.5.2 Storage Drives

This feature allows the user to specify the boot sequence from all available storage drives. The settings are Disabled and a list of all storage drives that have been detected (i.e., 1st Drive, 2nd Drive, 3rd Drive, etc).

- 1st Drive

3.5.3 Removable Drives

This feature allows the user to specify the boot sequence from available Removable Drives. The settings are 1st boot device, 2nd boot device, and Disabled.

- 1st Drive/2nd Drive

3.5.4 CD/DVD Drives

This feature allows the user to specify the boot sequence from available CD/DVD Drives (i.e., 1st Drive, 2nd Drive, etc).

- 1st Drive/2nd Drive

3.5.5 USB Drives

This feature allows the user to specify the boot sequence from available USB Drives.

3.5.6 Network Drives

This feature allows the user to specify the boot sequence from available Network Drives.

Retry Boot Devices

If this feature is enabled, the system will continue to search for the next boot device if the current boot device is not available. The options are Enabled, and **Disabled** (default).

3.6 Exit Options

Select the Exit tab from the AMI BIOS Se tup Utility screen to enter the Exit BIOS Setup screen.

Figure 3-5. Exit Options

3.6.1 Save Changes and Exit

When you have completed the system confi guration changes, select this option to leave the BIOS Setup Utility and reboot the computer, so the new system configuration parameters can take ef fect. Select Save Changes a nd Exit from the Exit menu and press <Enter>.

3.6.2 Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system configuration, and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

3.6.3 Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS Utility Program.

3.6.4 Load Optimal Defaults

To set this feature, select Load Optimal Defaults from the Exit menu and press <Enter>. Then, select OK to allow the AMI BIOS to automatically load Optimal Defaults to the BIOS Settings. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications.

3.6.5 Load Fail-Safe Defaults

To set this feature, select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The Fail-Safe settings are designed for maximum system stability, but not for maximum performance.

Appendix A

Connector Pinouts

This appendix provides connector pinouts for all standard user I/O interfaces on the rear I/O panel of the RES-12XR3.

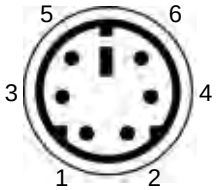
Note: For all special configuration I/O add-ons, please refer to the manufacturer's original documentation for information regarding Pinouts and signal definitions.

A.1 PS/2 Keyboard and Mouse

The RES-12XR3 provides a 6-pin **female** mini-DIN connector for the PS/2 keyboard, and another for the PS/2 mouse. Pinouts and signal definitions for both connectors are defined in *Table A-1*.

Table A-1. PS/2 Keyboard/Mouse Pinouts and Signal Definitions

Pinout



Pin	Signal Name
1	Keyboard/Mouse data
2	*N/C*
3	Ground
4	Vcc (+5V)
5	Keyboard/Mouse clock
6	*N/C*

A.2 USB Ports

The RES-12XR3 supports two USB (Universal Serial Bus) ports (see *Figure A-1* for pinouts), USB 0 and USB 1, on the rear I/O panel. In addition, six USB ports are supported from internal headers: USB 2/3, USB 4/5, USB 6, and USB 7.

Pinout descriptions are listed in *Table A-2*.

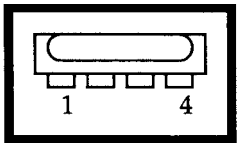


Figure A-1. USB Connector Pinout

Table A-2. USB Connector Signal Definitions

Pin	Signal Name	Pin	Signal Name
1	+5V	3	PO+
2	PO–	4	GND

A.3 Serial Ports

The RES-12XR3 supports one **male** DB9 serial port connector on the rear I/O panel (see *Figure A-2*)—TTYA (COM 1). Another serial port TTYB (COM 2) is accessed from the motherboard. COM 1 signal definitions are listed in *Table A-3*, page A-2.

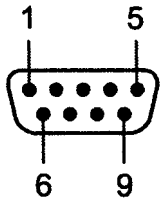


Figure A-2. COM 1 Serial Connector Pinout

Table A-3. COM 1 Serial Connector Signal Definitions

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
1	DCD	4	DTR	7	RTS
2	RXD	5	GND	8	CTS
3	TXD	6	DSR	9	RI

A.4 Gigabit Ethernet LAN Ports

The RES-12XR3 supports two RJ45 Gigabit Ethernet LAN port connectors—LAN 1 and LAN 2—each with two embedded LEDs (see *Figure A-3*). Pinout signal descriptions are listed in *Table A-4*. In addition, an IPMI-dedicated LAN port is located above on the rear I/O panel above the two USB ports.

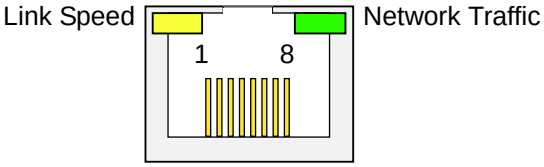


Figure A-3. Ethernet Connector, Type RJ45

Table A-4. RJ45 Ethernet Pinout Signals

Pin	Signal Name		Pin	Signal Name
1	TRD0+		5	TRD2+
2	TRD0–		6	TRD2–
3	TRD1+		7	TRD3+
4	TRD1–		8	TRD3–

- The color of the left LED indicates the LAN connection speed:
  - — Off = 10 MHz
  - — Green = 100 MHz
  - — Amber = 1 GHz
- The right LED, when lit, indicates LAN activity (network traffic).

A.5 VGA Display Port

The RES-12XR3 supports a single 15-pin (three 5-pin rows) **female** VGA graphics display port connector on the rear I/O panel (see *Figure A-4* for a connector pinout). Pinout signal descriptions are listed in *Table A-5*.

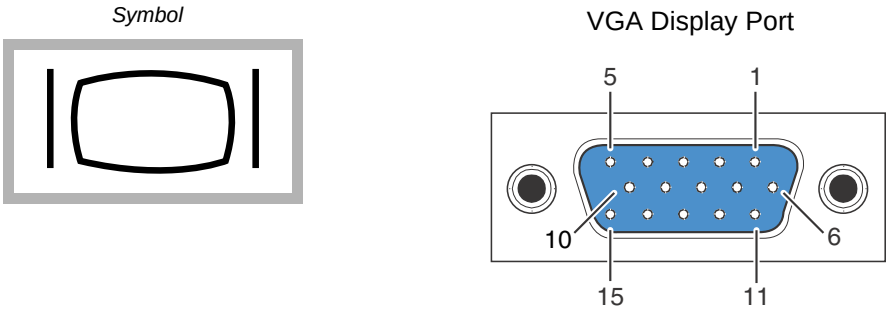


Figure A-4. VGA Connector Pinout

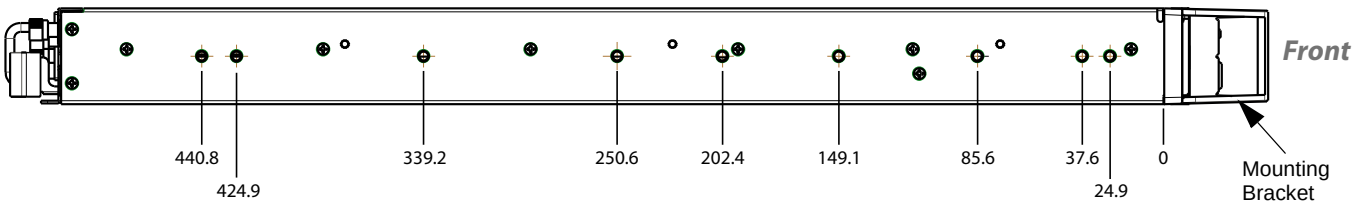
Table A-5. VGA Connector Pinout Signal Descriptions

Pin	Signal	Description
1	RED	Red video
2	GREEN	Green video
3	BLUE	Blue video
4	MS2	Monitor ID bit 2
5	GROUND	Ground (HSync)
6	GROUND	Red return
7	GROUND	Green return
8	GROUND	Blue return
9	NC	Key (no pin)
10	GROUND	Ground (VSync)
11	MS0	Monitor ID bit 0
12	MS1: SDA (DDC Data)	Monitor ID bit 1
13	HSYNC	Horizontal sync
14	VSYNC	Vertical sync
15	MS3: SCL (DDC CLK)	Monitor ID bit 3

Appendix B

Rack-Mount Slide Installation

An *optional* set of two rack-mount slides (left side and right side) is available for all RES-12 systems, and should be ordered at the time of purchase. The RES-12XR3 chassis contains nine threaded screw holes on each side to accommodate M4x6mm size screws (included with the rack-mount slide kit); steel slides require four mounting holes, and aluminum slides require three mounting holes (see *Figure B-1*).



Note: All dimensions are given in millimeters (mm), and measured from the baseline "0" of the drawing

Legend

Screw Hole Size = 4mm

Figure B-1. Screw Locations for Rack-Mount Slides

Dimensions of the screw-hole patterns on the sides of the RES-12XR3 chassis for installing rack-mount slides are shown in *Figure B-1*. The required holes for a specific steel or aluminum slide will have to be measured before installation.

Caution: Any screws used to mount a slide to a RES-12 chassis must not exceed a length of 6mm to prevent excessive penetration of the chassis.

The rack-mount slide installation kit (#119123-L01) includes the following items:

a. Two inside slide sections

b. Two outside slide sections

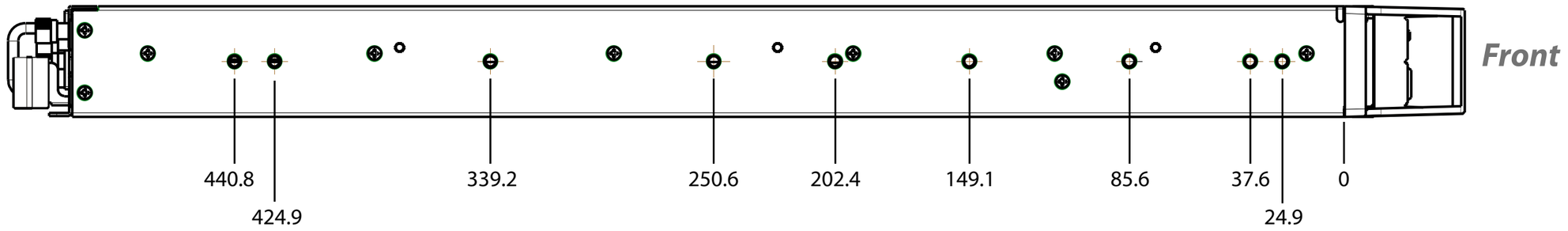
c. Two front (short) slide brackets

d. Two rear (long) slide brackets

e. Assorted screws, washers, and nuts (Kit #110854-003)

Follow these steps to install a steel rack-mount slide to the RES-12XR3 chassis:

1. Attach the inside slide section (see *Figure B-2* on page B-3) to both sides of the RES-12XR3 chassis using four M4x6mm screws per side.
2. Measure the depth of the 19” equipment rack into which the RES-12XR3 system will be installed (this can vary from 24” to 30”).
3. Using the depth of the equipment rack, adjust and attach the front and rear slide brackets to the outside slide section using the M4x10mm screws, washers, and nuts provided with the slide kit.
4. With all slide brackets securely attached to both the right and left outside slide sections, install both sections to the inside right and inside left of a 19” rack with two bolts per bracket, making sure there is adequate room for the 1RU height (1.75”) of a RES-12XR3 system.
5. Carefully insert the RES-12XR3 system into the 19” rack so that the inside slides on both sides of the chassis travelsmoothly into the channels of the outside slide sections. Push the system into the rack until the mounting brackets on the front of the chassis are flush with the front of the rack.
6. Secure the RES-12XR3 system to the 19” rack with two bolts on each side.



A Side View of the RES-12XR3 Slide Installation

Note: All Dimensions are given in millimeters (mm), measured from the “0”

B RES-12XR3 Rack-Mount Slide Installation

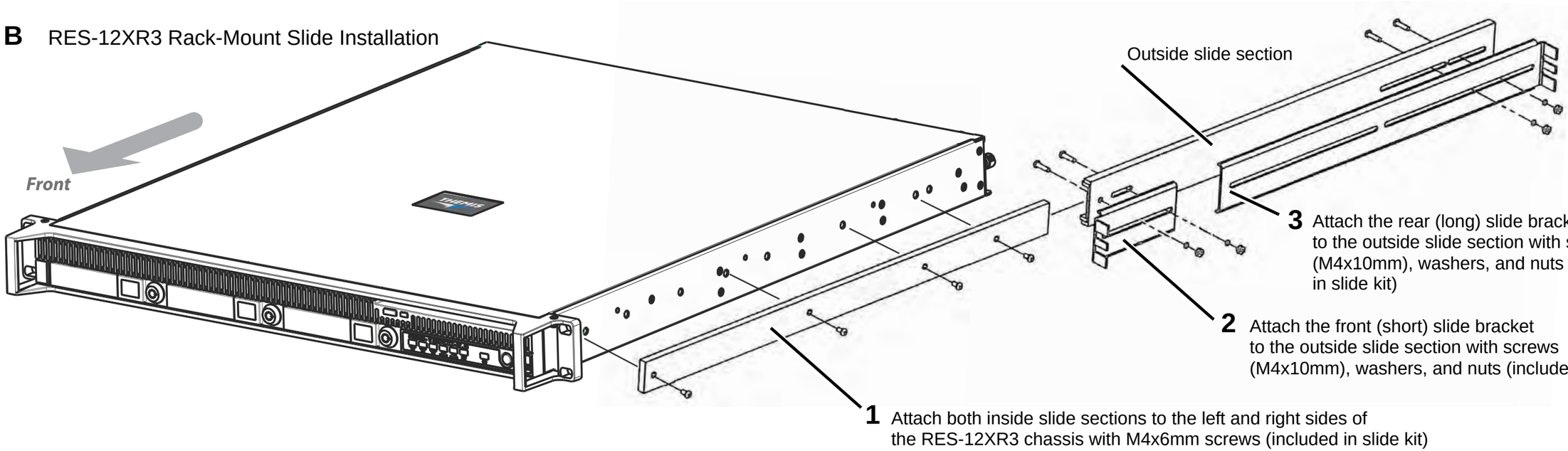


Figure B-2. RES-12XR3 Rack-Mount Slide Installation

Appendix C

Red Hat Enterprise Linux 5 Installation

C.1 Introduction

Welcome to the Red Hat® Enterprise Linux® Installation Guide. This guide contains useful information to assist you during th e installation of Red Hat Enterprise Linux via DVD device. From fundamental concepts such as installation preparation to the step-by-step installation procedure.

C.2 Installation

Step 1: Insert the Redhat Enterprise Linux 5 DVD and Power on the system; you will see the first installation screen wi th a boot prompt, pres s “ENTER” to begin installation (see *Figure C-1* on page C-2).

Figure C-1. Power On after Linux DVD is Inserted into Drive

Step 2: Press the "tab" key to move focus to the "Skip" key, then press "Enter" key to Continue (see ***Figure C-2***).

Figure C-2. Skip Key

Step 3: Press Enter and you will see the **Welcome** screen. Welcome screen does not prompt you for any input. From this screen you can access the Release Notes for Red Hat Enterprise Linux 5.0.0 by clicking on the Release Notes button (see *Figure C-3*.)

Figure C-3. Welcome Screen

Click on the **Next** button to continue.

Step 4: Using your mouse, select a language to use for the installation. The language you select here will become the default language for the operating system once it is installed. Selecting the appropriate language also helps target your time zone configuration later in the installation. The installation program tries to define the appropriate time zone based on what you specify on this screen (see *Figure C-4* on page C-4).

Figure C-4. Language Selection

Once you select the appropriate language, click **Next** to continue.

Step 5: Using your mouse, select the correct layout type (for example, U.S. English) for the keyboard you would prefer to use for the installation and as the system default (see *Figure C-5* on page C-5).

Figure C-5. Selecting Layout Type

Once you have made your selection, click **Next** to continue.

Step 6: Enter the installation number, if you don't have an installation number; select the Skip Entering Installation Number Radio Button. Click OK, and if you did not enter an installation number, you'll be given a warning. Click Skip to continue (see *Figure C-6* on page C-6).

Figure C-6. Enter Installation Number

Click **Next** to continue.

Step 7: Partitioning allows you to divide your st orage drive into isolated sections, where each section behaves as its own storage drive. Partitioning is particularly useful if you run multiple operating systems.

On this screen you can choose to create the default layout or choose to manual partition using the 'Create custom layout' option of **Disk Druid**.

The first three options allo w you to perform an automated installation without having to partition your drive(s) yourself. If you do not feel comfortable with partitioning your system, it is recommended that you *do not* choose to create a custom layout and instead let the installation program partition for you.

You can configure an iSCSI tar get for installation, or disable a dmraid device from this screen by clicking on the 'Advanced storage configuration' button (see *Figure C-7* on page C-7).

Figure C-7. Partitioning

Click **Next** to continue.

Step 8: Create default layout allows you to have some control concerning what data is removed (if any) from your system. Your options are:

- Remove all partitions on selected drives and create default layout — select this option to remove all partitions on your storage drive(s) (this includes partitions created by other operating systems such as Windows VFAT or NTFS partitions).
- Remove Linux partitions on selected drives and create default layout — select this option to remove only Linux partitions (partitions created from a previous Linux installation).
- This does not remove other partitions you may have on your storage drive(s) (such as VFAT or FAT32 partitions).
- Use free space on selected drives and create default layout — select this option to retain your current data and partitions, assuming you have enough free space available on your storage drive(s).

Using your mouse, choose the storage dr ive(s) on which you want Red Hat Enter - prise Linux to be installe d. If you have two or more drives, you can choose which drive(s) should contain this installation. Unselected drives, and any data on them, are not touched.

To review and make any necessary changes to the partitions created by automatic partitioning, select the **Review** option. After selecting **Review** and clicking **Next** to move forward, the partitions created for you in **Disk Druid** appear. You can make modifications to these partitions if they do not meet your needs (see *Figure C-8*).

Figure C-8. Reviewing Option

Click **Next** once you have made your selections to proceed.

Step 9: If you chose one of the automatic partitioning options and selected Review, you can either accept the current partition settings (click Next), or modify the setup using Disk Druid, the manual partitioning tool.

If you chose to create a custom layout, you must tell the installation program where to install Red Hat Enterprise Linux. This is done by defining mount points for one or more disk partitions in which Red Hat Enterprise Linux is installed. You may also need to create and/or delete partitions at this time (see *Figure C-9* on page C-9).

Figure C-9. Creating a Custom Layout

Click **Next.**

Step 10: Once you have configured your partitions, set up a boot loader . If you select "No" Boot Lo ader will be Installed, you'll need to use a third-party boot loader such as Partition Magic or Microsoft's TLDR. Unless you want to set up a Boot Loader Password or Configure Advanced Boot Loader Options (see *Figure C-10* on page C-10).

Figure C-10. Setting Up Boot Loader

To configure more advanced boot loader options, such as changing the drive order or passing options to the kernel, be sure **Configure advanced boot loader options** is selected before clicking **Next**.

Step 11: Now that you have chosen which boot loader to install, you can also determine where you want the boot loader to be installed. You may install the boot loader in one of two places:

- **The master boot record (MBR)** — This is the recommended place to install a boot loader, unless the MBR already starts another operating system loader, such as System Commander.
- The MBR is a special area on your storage drive that is automatically loaded by your computer's BIOS, and is the earliest point at which the boot loader can take control of the boot process. If you install it in the MBR, when your machine boots, GRUB presents a boot prompt. You can then boot Red Hat Enterprise Linux or any other operating system that you have configured the boot loader to boot (see *Figure C-11* on page C-11).

- **The first sector of your boot partition** — This is recommended if you are already using another boot loader on your system. In this case, your other boot loader takes control first. You can then configure that boot loader to start GRUB, which then boots Red Hat Enterprise Linux.

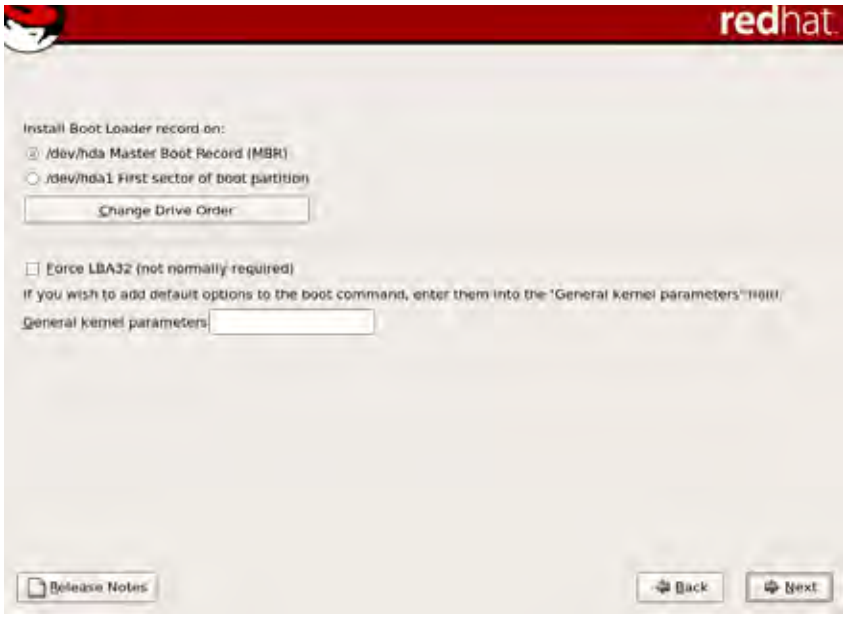


Figure C-11. Master Boot Record (MBR)

If your system only uses Red Hat Enterprise Linux, you should choose the MBR.

Click the **Change Drive Order** button if you would like to rearrange the drive order or if your BIOS does not return the correct drive order. Changing the drive order may be useful if you have multiple SCSI adapters, or both SCSI and IDE adapters, and you want to boot from the SCSI device.

Click **Next**.

Step 12: The installation program automatica lly detects any ne twork devices you have and displays them in the **Network Devices** list (see *Figure C-12*).

Figure C-12. Network Devices List

Step 13: Once you have selected a network device, click **Edit**. From the **Edit Interface** pop-up screen, you can choos e to configure the IP address and Netmask (for IPv4 - Prefix for IPv6) of the device via DHCP (or manually if DHCP is not selected) and you can choose to activate the device at boot time.

If you select **Activate on boot**, your network interface is started when you boot (see *Figure C-13* on page C-13). If you do not haveDHCP client access or you are unsure what to provide here, please contact your network administrator.

Figure C-13. Edit Interface Pop-Up Screen

Click **OK.**

Step 14: Set your time zone by selecting the city closest to your computer's physical location. Click on the map to zoom in to a particular geographical region of the world (see *Figure C-14* on page C-14).

From here there are two ways for you to select your time zone:

- Using your mouse, click on the interactive map to select a specific city (represented by a yellow dot). A red X appears indicating your selection.
- You can also scroll through the list at the bottom of the screen to select your time zone. Using your mouse, click on a location to highlight your selection.

Figure C-14. Selecting Time Zone

Click **Next**.

Step 15: Setting up a root account and password is one of the most important steps during your installation.

Your root account is similar to the administrator account used on W indows NT machines.

The root account is used to install p ackages, upgrade RPMs, and perform most system maintenance.

Logging in as root gives you complete control over your system (see *Figure C-15* on page C-15).

Figure C-15. Setting Up Root Account and Password

Click **Next**.

Step 16: Now that you have made most of the choices for your installation, you are ready to confirm the default package selection or customize packages for your system.

The Package Installation Defaults screen appears and details the default package set for your Red Hat Enterprise Linux installation. This screen varies depending on the version of Red Hat Enterprise Linux you are installing (see *Figure C-16* on page C-16).

To customize your package set further , select the **Customize now** option on the screen. Clicking **Next** takes you to the **Package Group Selection** screen.

You can select package groups, which group components together according to function (for example, **X Window System** and **Editors**), individual packages, or a combination of the two.

To select a component, click on the checkbox beside it:

Figure C-16. Package Installation Default Screen

Step 17: Select each component you wish to install.

Once a package group has been selected, if optional components are available you can click on Optional packages to view which packages are installed by default, and to add or remove optional packages from that group (see *Figure C-17* on page C-17). If there are no optional components, this button will be disabled

Figure C-17. Optional Packages

Click **Next**.

Step 18: Once you have selected the packag e groups of your choice, you get one last chance to go back befo re starting the installation pr ocess. Click Next if you're happy with your choices, or click Back to make changes (see *Figure C-18* on page C-18).

Figure C-18. Option to Review or Continue

Click **Next**.

Step 19: Installation Starts (see *Figure C-19*).

Figure C-19. Installation Begins

Step 20: Congratulations! Your Red Hat Enterprise Linux installation is now complete!

The installation program prompts you to prepare your system for reboot. Remember to remove any installation media if it is not ejected automatically upon reboot (see *Figure C-20*).

Figure C-20. Installation is Complete

After your computer's normal power-up sequence has completed, the graphical boot loader prompt appears at which you can do any of the following things:

- Press **Enter** — causes the default boot entry to be booted.
- Select a boot label, followed by Enter — causes the boot loader to boot the operating system corresponding to the boot label.
- Do nothing — after the boot loader's timeout period, (by default, five seconds) the boot loader automatically boots the default boot entry.

Do whatever is appropriate to boot Red Hat Enterprise Linux. One or more screens of messages should scroll by.

Step 21: Eventually, a login: prompt or a GUI login screen (if you installed the X Window System and chose to start X automatically) appears (see *Figure C-21*.

Figure C-21. Login Screen

Step 22: Once logged in, you are ready to use the desktop (see *Figure C-22*).

Figure C-22. Ready to use the Desktop

Appendix D

Optional Remote On/Off Switch

D.1 Remote On/Off Configuration

Customers interested in installing an *optional* switch from which to remotely turn the RES-12XR3 Configuration 7 **on** or **off** are able to order a Remote On/Off Switch module that is easily installed in an available storage-drive bay (see *Figure D-1*, which shows the Remote On/Off Switch installed in an RES-32XR3/FIO system).

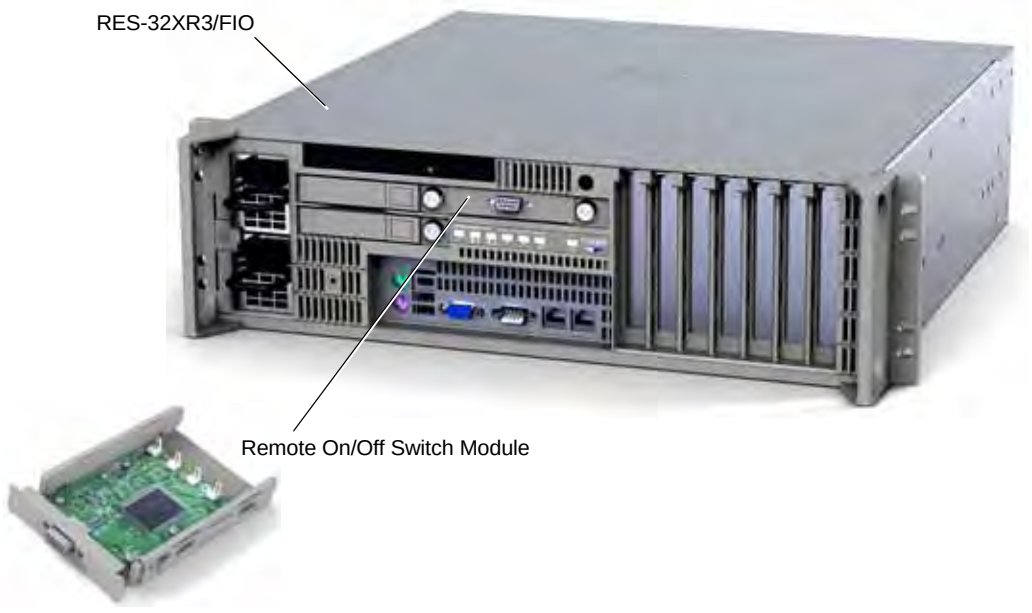


Figure D-1. Remote On/Off Switch Module

The Remote On/Off Switch module is installed after first removing one of the existing RES-12XR3 storage drives (any except the boot drive), then installing a cable with a standard male DB9 connector at one end and an On/Off switch (an LED is *optional*) at the other end.

When operational, if the RES-12X R3 Configuration 7 is turned **OFF**, pressing the remote switch ON will turn the system on.

D.2 Remote On-Only Configuration

When the Remote On/Off Switch module is configured as an ON-only device, pressing the remote switch ON will turn the system on. Turning the RES system off, however, requires pressing the ON/OFF button that is located directly on the front of the RES-12XR3 chassis.

D.3 Ordering the Remote On/Off Switch

Because internal modifications must be made to the RES-12XR3 Configuration 7 in order to support the Remote On/Off Switch module, the module must be ordered and installed at the time your system is ordered.

Appendix E

Optional RES Audio/USB/Serial Port Module

E.1 RES Audio/USB/Serial Port Custom Module

Customers interested in adding audio, USB, and serial port capabilities to the front of any RES system can easily order an *optional* RES Audio/USB/Serial Port Custom Module (see *Figure E-1*) that is installed at the Themis factory into an available storage-drive bay (see following *Caution*).

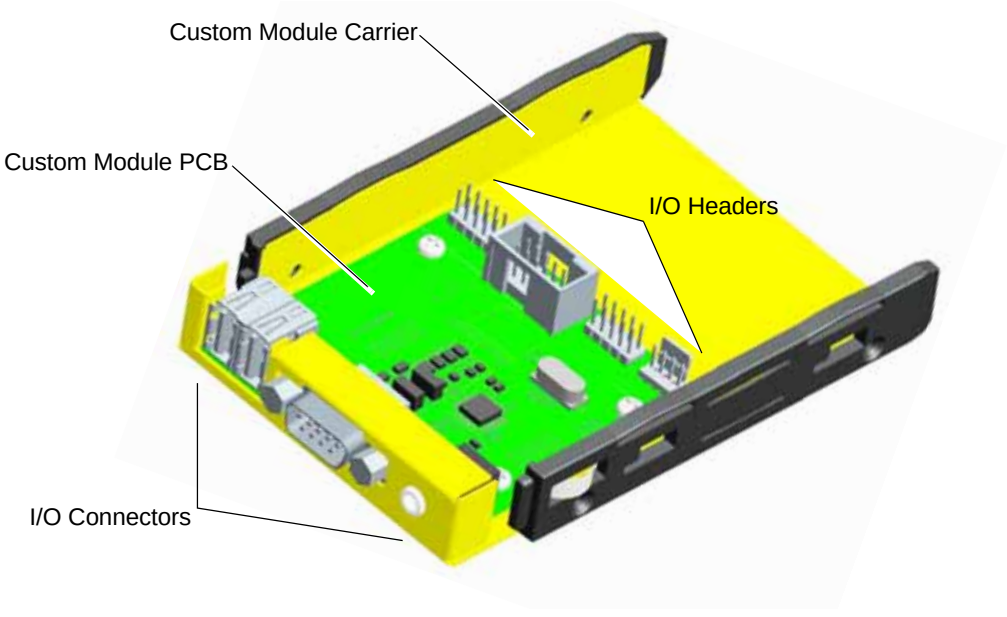


Figure E-1. RES Audio/USB/Serial Port Custom Module

Caution: Because connections must be made internally from the RES Custom Module to the RES motherboard, the RES Custom Module must be installed at the Themis factory before being shipped to the customer. Do not attempt to remove the RES Custom Module from its drive slot unless you have some hardware experience (see the following paragraph, *Figure E-2*, and *Figure E-3* on page E-3.

The RES Audio/USB/Serial Port Custom Module is installed after first removing one of the existing RES storage drives (any one except the boot drive) then connecting the appropriate I/O cables from the RES Audio/USB/Serial Port Custom Module to the external devices. After the storage drive has been removed from the system, cables from the internal RES motherboard are fed through the open drive slot and attached to the I/O headers on the top surface of the Custom Module PCB, and the Module is inserted into the vacant drive slot (see *Figure E-2*). [Note that a RES-32XR3/FIO is shown in this Appendix, although the Module may be installed into any RES system.] *Figure E-3* on page E-3 shows the internal connections that are made between the RES Custom Module and the RES motherboard.

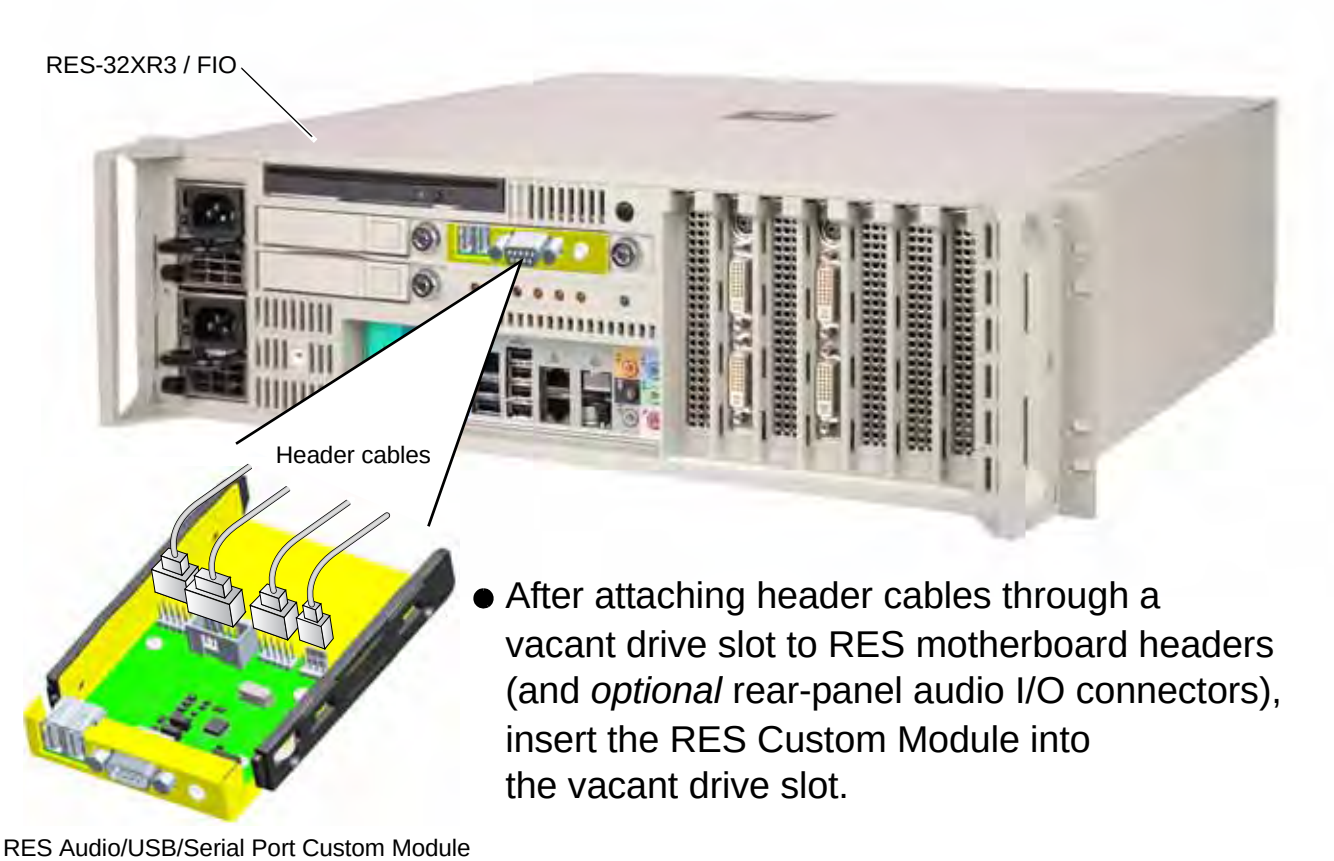


Figure E-2. Install the RES Audio/USB/Serial Port Custom Module

E.1.1 Attach I/O Cables

Figure E-3 shows the three types of I/O s upported by the RES Audio/USB/Serial Port Custom Module:

- USB Port A and Port B
- One Serial Port
- One *optional* Stereo Audio Jack (installed only by customer request)

Figure E-3 also shows the header connectors th at are routed by cable through the empty drive slot into the RES system for connection to the proper RES motherboard surface headers or *optional* rear audio connectors.

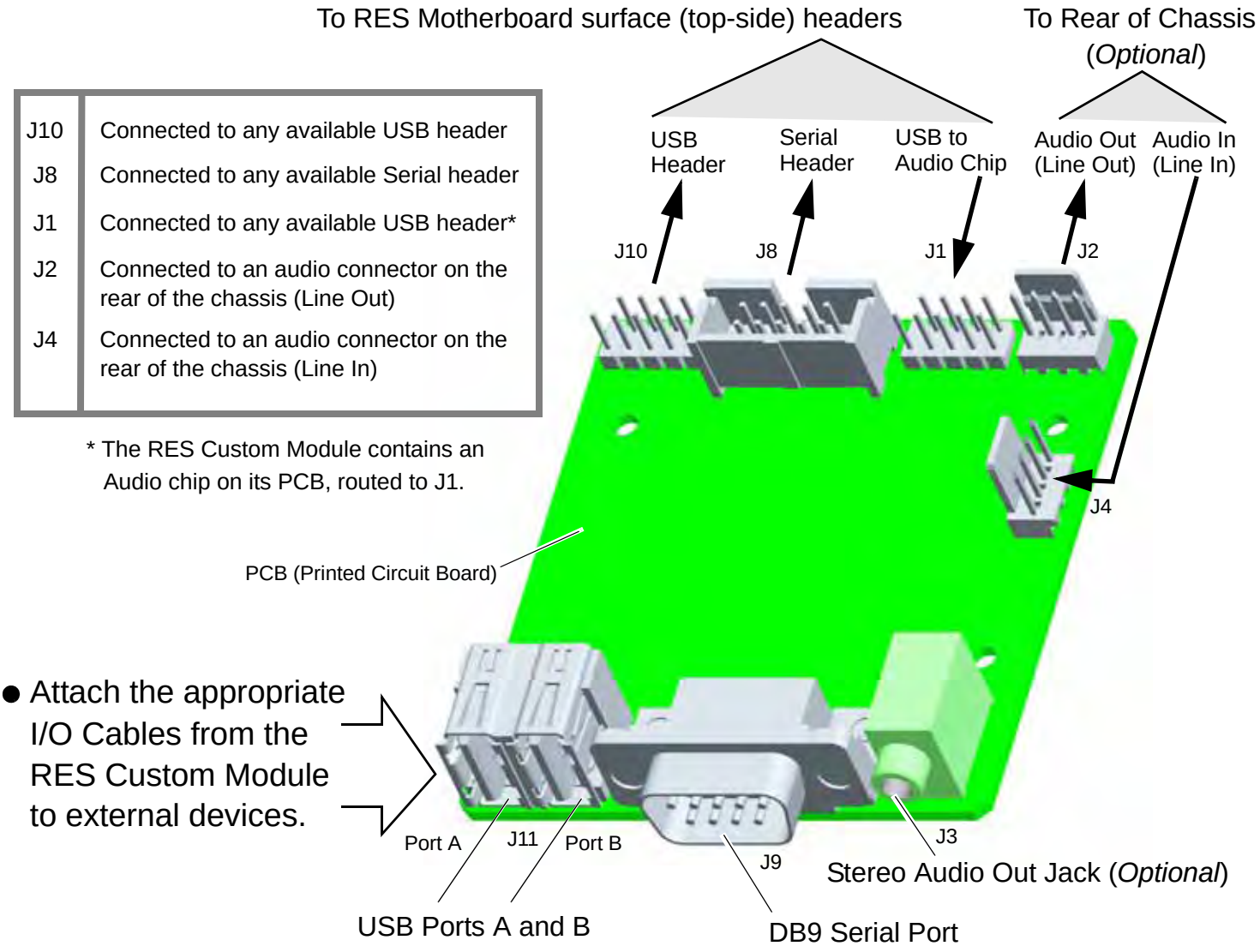


Figure E-3. Attach the Appropriate I/O Cables

If the RES Audio/USB/Serial Port Custom Module is removed from its drive slot, it is recommended that the end of the motherboard I/O cable attached to the Module header be appropriately tagged so that it can be correctly reconnected when the Module is reinstalled. If the I/O cable is removed from its motherboard header, it should also be appropriately tagged for proper reconnection at a later time.

E.1.2 Connector Pinouts

E.1.2.1 USB Ports A and B

The RES Audio/USB/Serial Port Custom Module supports two USB (Universal Serial Bus) port connectors (see *Figure E-4* for pinouts), USB A and USB B, on the front I/O panel.

USB pinout descriptions are listed in *Figure E-4*; pinout signal descriptions are described in *Table E-1*.

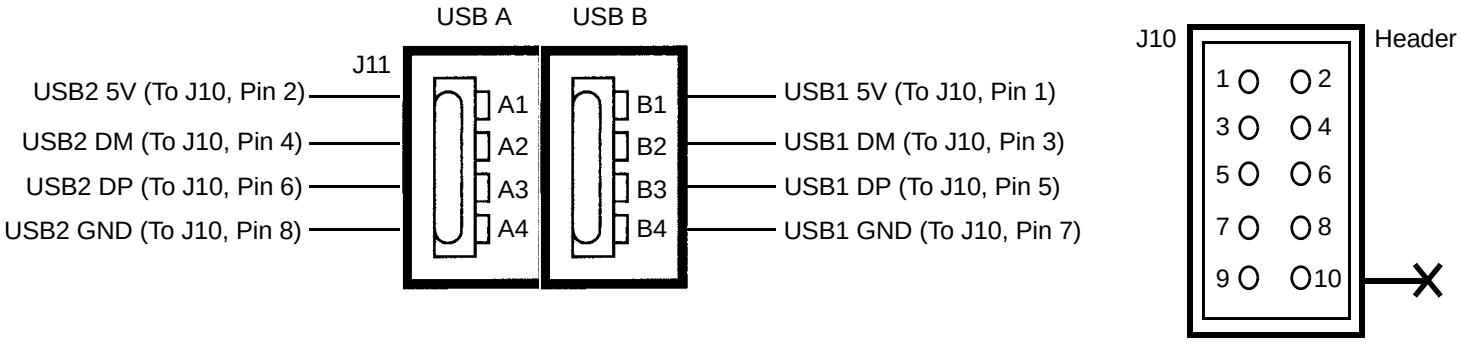


Figure E-4. Dual USB Connector Pinouts

Table E-1. Dual USB Connector Pinout Signal Descriptions (J10)

Pin	Signal Name	Pin	Signal Name
1	+5V	2	+5V
3	DM (Data Minus)	4	DM (Data Minus)
5	DP (Data Plus)	6	DP (Data Plus)
7	Ground	8	Ground
9	*Cut Off for Keying*	10	*No Connection*

E.1.2.2 Serial Port COM1

The RES Custom Module supports one **male** DB9 serial port co nnector (J9) on the front I/O panel (see *Figure E-5*)—COM1.

The COM1 pinout is listed in *Figure E-5*; pinout signal descriptions are described in *Table E-2*, which also shows the serial header (J8) connections to serial port J9.

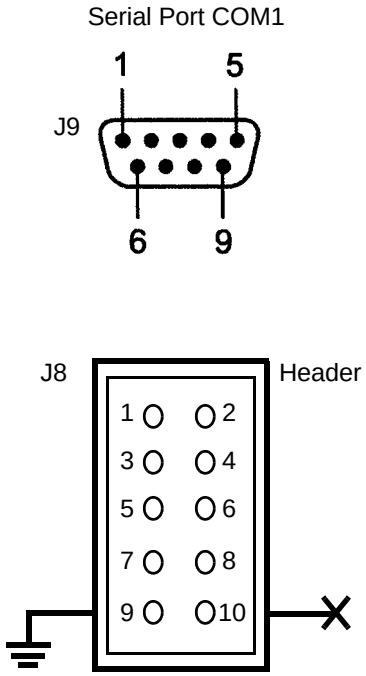


Figure E-5. COM1 Serial Connector Pinout

Table E-2. COM1 Serial Connector Pinout Signal Descriptions (J8 and J9)

J8 Pin	Signal Name	Connected to J9 Pin
1	DCD	1
2	DSR	6
3	RXD	2
4	RTS	7
5	TXD	3
6	CTS	8
7	DTR	4
8	RI	9
9	GND	5

E.1.2.3 Stereo Audio Ports (*Optional*)

The RES Custom Module supports one *optional* Stereo Audio Out jack on the front I/O panel (see *Figure E-6*).

The Stereo Audio Out pinout is listed in *Figure E-6*; header J1 pinout signal descriptions are described in *Table E-3*.

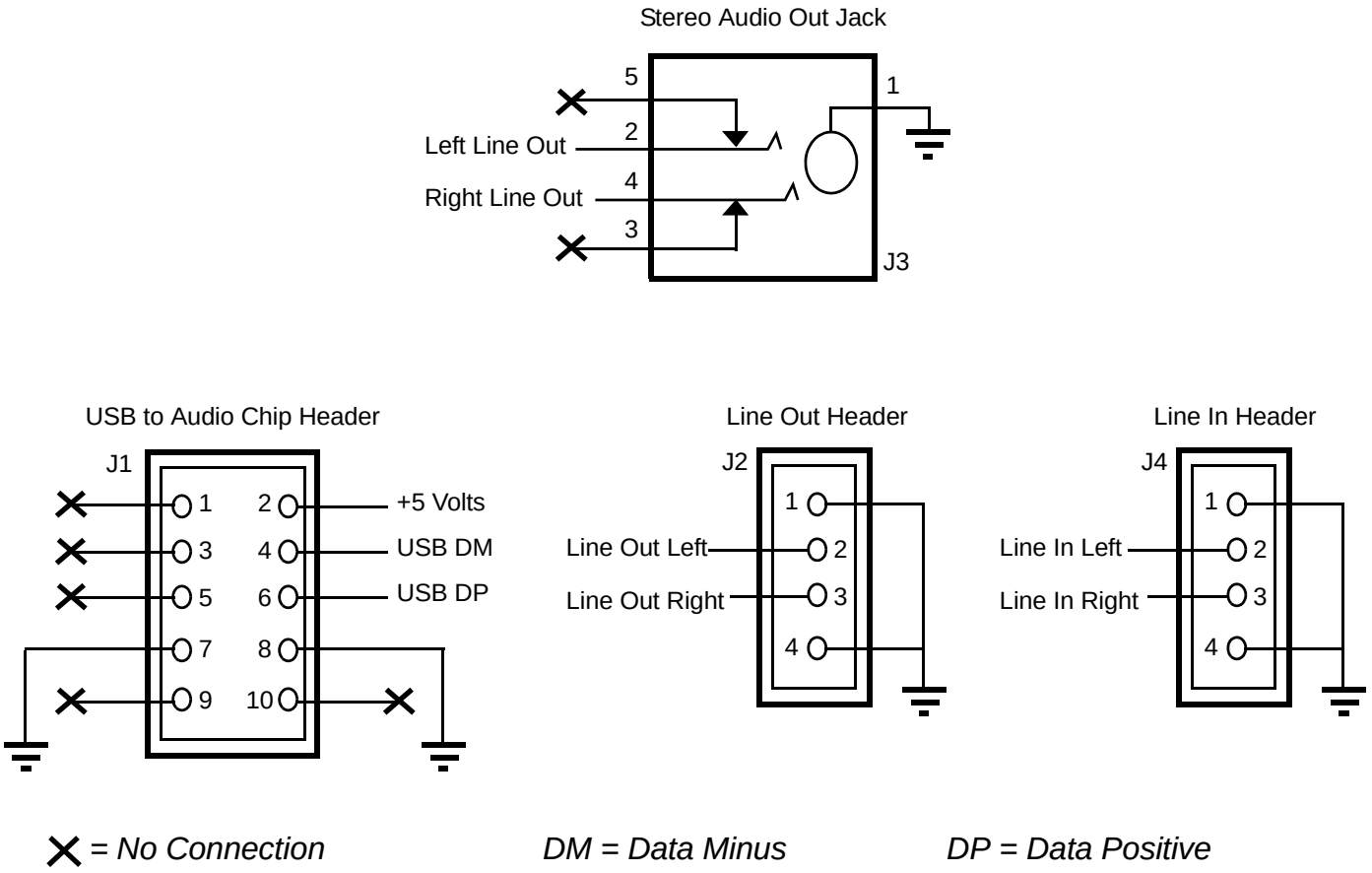


Figure E-6. Stereo Audio Connector Pinout

Table E-3. Stereo Audio Out Connector Pinout Signal Descriptions (J1)

Pin	Signal Name
1	*No Connection*
2	+ 5 volts
3	*No Connection*

Pin	Signal Name
4	Data Minus
5	*No Connection*
6	Data Plus

Pin	Signal Name
7	Ground
8	Ground
9	*No Connection*

E.2 Ordering the RES Audio/USB/Serial Port Custom Module

Because internal modifications must be made to the RES chassis in order to support the RES Audio/USB/Serial Port Custom Module, the Custom Module must be specified on the purchase order for your RES system.

Appendix F

Repackaging Instructions

F.1 Repackaging for Shipment

If it becomes necessary for any reason to return your RES-12XR3 unit back to Themis, it is very important that the original packaging materials be used according to the repackaging instructions found in this appendix. Themis has qualified all of its shipping materials to meet the highest of standards and the rigors of today's shipping methods, thus insuring total protection of your product during delivery. Failure to use original packaging materials, exactly as described in this appendix **may invalidate the warranty**. If the original packaging is no longer serviceable, or no longer available, please contact Themis Customer Support for a new shipping box to send back your RES-12XR3.

Caution: Failure to use the original Themis packaging materials, and failure to follow the instructions of this Appendix F, **may invalidate the warranty**.

The following instruction assume the original packaging components are still available, and in serviceable condition. If not, please contact Themis for a new shipping box and packaging components for your RES-12XR3.

F.2 Packaging Components

The original packaging components are shown in *Figure F-1*. They comprise a packaging box, bottom foam layer, and two top foam layers. The two top foam layers are identical components, placed so that the rear most edge and from most edge touch the inner wall of the bottom foam layer. This will leave a small horizontal gap in the middle in which accessories will be placed, *i.e., power cables*.

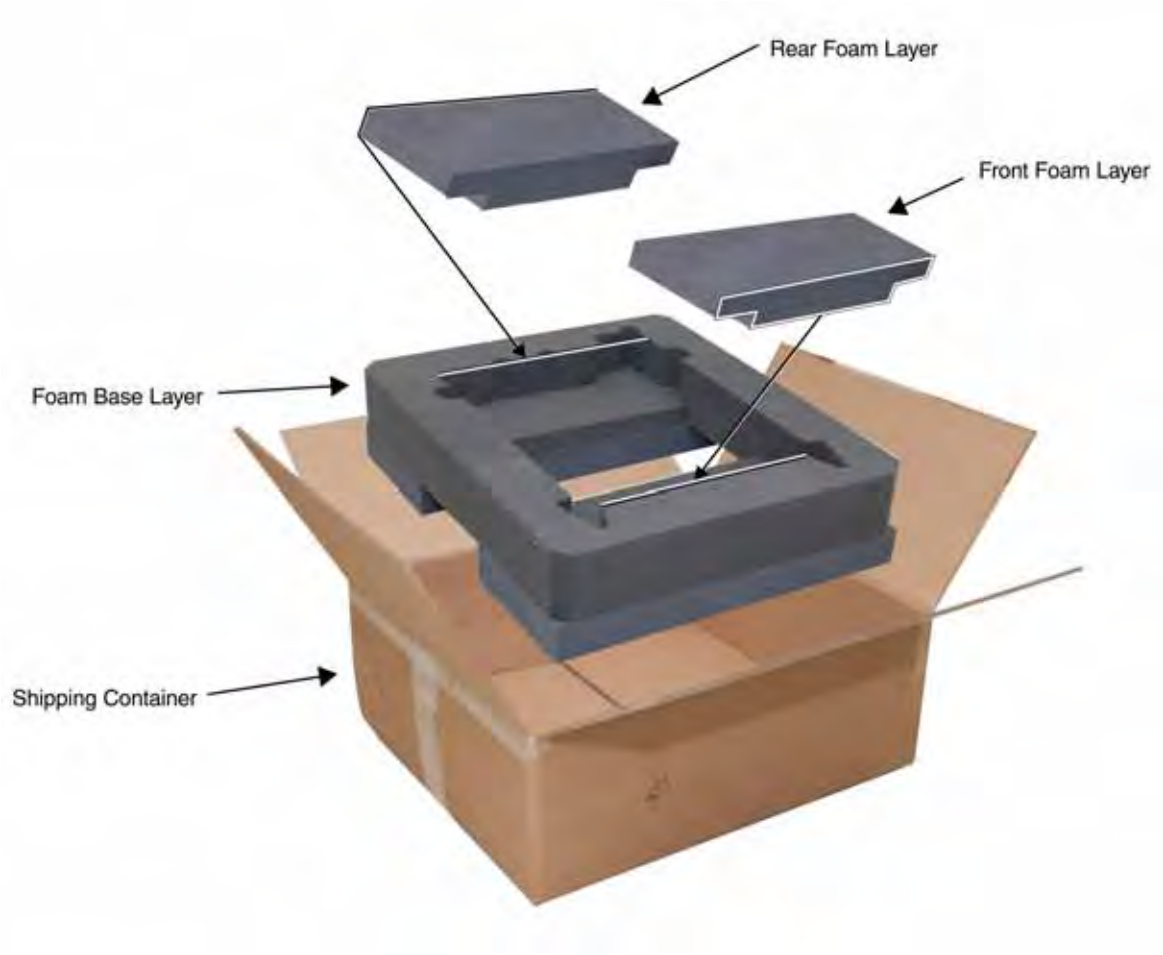


Figure F-1. Packaging Components

F.3 Instructions for Repackaging

Re-assemble the packaging material about the equipment in accordance with the following instructions (see *Figure F-2* on page F-4:

1. Inspect the original packing materials for serviceability.
2. Place the foam crush-resistant base layer in the bottom of the box.
3. Place the equipment in the cutout of the bottom layer, unit fitting snugly inside.
4. Place the two top crush-resistant layers, two the rear and front of the RES-12XR3. This will leave a small horizontal gap in which accessories can be placed.
5. Make sure all components of the box are firmly in place, pressing down on the surface area of the foam to insure proper seating of the material.
6. Seal the top of the box with strong packing tape, wrapping the tape completely around the box, both lengthwise, and crosswise.
7. Prepare for shipment in accordance with the instructions received from Themis Computer.

Note: Please contact Themis if new packaging material, or shipping instructions are required. You can reach Themis at +1 (510) 252–0870 Mon—Fri, 8am—5pm PST, or by Email to support@themis.com.

The order of assembly when repackaging the RES-12XR3 for shipment as shown in *Figure F-2*

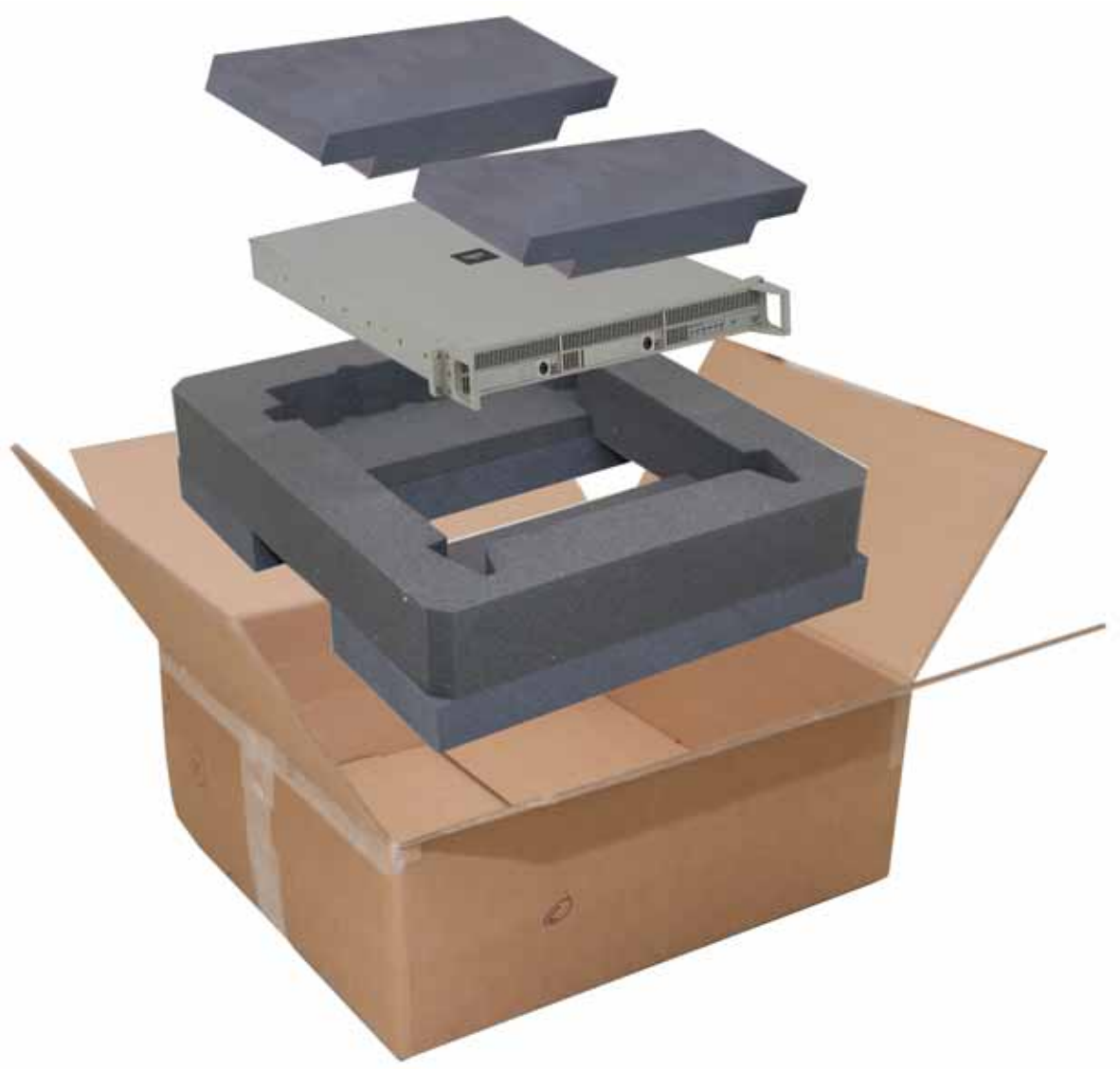


Figure F-2. Order of Assembly

Index

K

L

M

N

O

P

Place
Stamp
Here

Themis Computer

47200 Bayside Parkway

Fremont, CA 94538

Attn: Publications Department

Fold here; tape at top to seal

Reader Comment Card

We welcome your comments and suggestions to help improve the *RES-12XR3 Configuration 7 Installation Manual*. Please take time to let us know what you think about this manual.

- Information provided in the manual was complete.

  Agree___ Disagree___ Not Applicable___

- Information was well documented and easy to follow.

  Agree___ Disagree___ Not Applicable___

- Information was easily accessible.

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